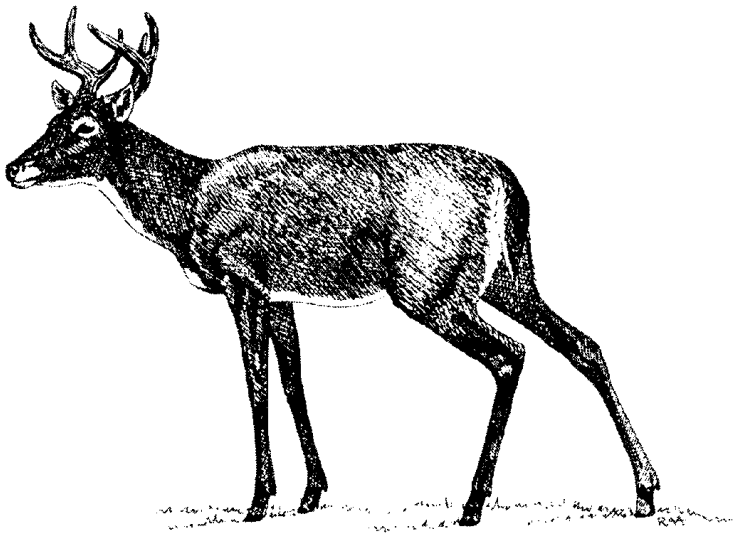
ENVIRONMENTAL ASSESSMENT

An Integrated Wildlife Damage Management Approach For the Management of White-tailed Deer Damage In the State of North Carolina

October 2005



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List of Acronyms

ADC	Animal Damage Control
AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BASH	Bird/Wildlife Aircraft Strike Hazard
BCC	Biological Carrying Capacity
CCC	Cultural Carrying Capacity
CDC	Center for Disease Control
CEQ	Council on Environmental Quality
CWD	Chronic Wasting Disease
DEA	Drug Enforcement Administration
DMP	Deer Management Permits
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
HGE	Human granulocytic ehrlichsis
HME	Human monocytic ehrlichiosis
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MIS	Management Information Systems
MOU	Memorandums of Understanding
NCDA	North Carolina Department of Agriculture
NCDENR	North Carolina Department of Environment and Natural Resources
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NWRC	National Wildlife Research Center
SOP	Standard Operating Procedures
T & E	Threatened and Endangered (species)
USDA	United States Department of Agriculture
USFDA	United States Food and Drug Administration
USFWS	United States Fish and Wildlife Service
WS	Wildlife Services (USDA, APHIS)

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

Within North Carolina and across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with wildlife that increases the potential for conflicting human/wildlife interactions. In addition, segments of the public desire protection for all wildlife; this protection can create localized conflicts between human and wildlife activities. The *Animal Damage Control Programmatic Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (United States Department of Agriculture (USDA) 1997):

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and value is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well.*"

WS is a cooperatively funded, service-oriented program from which other governmental agencies and entities may request assistance. Before any wildlife damage management is conducted, Cooperative Agreements, Agreements for Control or other comparable documents are in place. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently according to applicable federal, State and local laws; and Memorandums of Understanding (MOUs) between WS and other agencies. WS's mission, developed through its strategic planning process, is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* WS's Policy Manual reflects this mission and provides guidance for engaging in wildlife damage management through:

- training of wildlife damage management professionals;
- development and improvement of strategies to reduce losses and threats to humans from wildlife;
- collection, evaluation, and dissemination of management information;
- informing and educating the public on how to reduce wildlife damage; and
- providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1999).

Wildlife damage management is the science of reducing damage or other problems caused by wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1992). Wildlife Services (WS) uses an Integrated Wildlife Damage Management (IWDM)

approach, known as Integrated Pest Management (WS Directive 2.1051), in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1:1-7 of USDA (1997). These methods may include alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may require that the local populations of offending animal(s) be reduced through lethal means.

This environmental assessment (EA) documents the analysis of the potential environmental effects of a proposed integrated white-tailed deer (*Odocoileus virginianus*) damage management program to alleviate damage to agriculture, property, natural resources, and human health and safety. This analysis relies mainly on existing data contained in published documents (Appendix A), including the *Animal Damage Control Program Final Environmental Impact Statement* (USDA 1997). USDA 1997 may be obtained by contacting the USDA, Animal and Plant Health Inspection Service (APHIS), WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

The authority for management of resident wildlife species is the responsibility of the North Carolina Wildlife Resources Commission (NCWRC). The NCWRC collects and compiles information on white-tailed deer population trends and take, and uses this information to manage deer populations. This information has been provided to WS to assist in the analysis of potential impacts of WS activities on the deer herd in North Carolina.

WS is a federal agency authorized to protect American resources from damage associated with wildlife (Act of March 2, 1931, as amended 46 Stat. 1486; 7 USC. 426-426c and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, Public law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 USC 426C) and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767)). To fulfill this Congressional direction, WS activities are conducted to prevent or reduce wildlife damage caused to agricultural, industrial and natural resources, property, and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, private organizations, and individuals. Therefore, wildlife damage management is not based on punishing offending animals but as one means of reducing damage and is used as part of the WS Decision Model (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public. Wildlife Service's vision is to improve the coexistence of people and wildlife, and its mission is to provide Federal leadership in managing problems caused by wildlife.

Normally, according to the APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions may be categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6,000- 6,003, (1995)). WS has decided in this case to prepare this EA to facilitate planning, interagency coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and

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1 WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed and planned damage management program. All wildlife damage management that would take place in North Carolina would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA). Notice of the availability of this document will be made available consistent with the agency's NEPA procedures.

1.2 Preferred Alternative

Wildlife Services proposes to continue the current damage management program that responds to requests for white-tailed deer damage assistance in the State of North Carolina. An IWDM approach would be implemented in consultation and coordination with the NCWRC to alleviate white-tailed deer damage to agriculture, property, natural resources, and human health and safety on all private and public lands of North Carolina where a need exists, assistance is requested from landowners or public officials, and funding is available. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, white-tailed deer, other species, and the environment. Under this action, WS would provide technical assistance and operational damage management, including non-lethal and lethal management methods (see Appendix B) by applying the WS Decision Model (Slate et al.1992). When appropriate, habitat modifications, harassment, repellents, and physical exclusion could be recommended and utilized to reduce deer damage. In other situations, deer would be removed as humanely as possible by sharpshooting and live capture followed by euthanasia under permits issued by the NCWRC. In determining the damage management strategy, preference would be given to practical and effective nonlethal methods. However, nonlethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of nonlethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. Deer damage management would be conducted in the State, when requested, on private or public property after an *Agreement for Control* or other comparable document has been completed. All deer damage management would be consistent with other uses of the area and would comply with appropriate federal, state and local laws.

1.3 Purpose

The purpose of this EA is to address and evaluate the potential impacts to the human environment from the implementation of a WS white-tailed deer damage management program. The program is primarily directed to the alleviation of deer damage and conflicts associated with agricultural resources, urban/suburban landscaping, property, natural resources, human safety from deer-vehicle and deer-aircraft collisions, and concerns about the spread of disease. Under the Preferred Alternative (Integrated Deer Damage Management Program), deer damage management could be conducted on private, federal, state, tribal, county, and municipal lands in the State of North Carolina upon request for WS assistance.

1.4 Background and Need for Action

1.4.1 History of White-tailed Deer Management in North Carolina

White-tailed deer inhabited all of North Carolina and eastern North America before the arrival of European immigrants. Deer were an important resource to the Native Americans who hunted deer year-round. In North Carolina, wolves and cougars also preyed on white-tailed deer. The first European settlers in North Carolina hunted the white-tailed deer for meat and hides to provide them with food and clothing (Osborne 1993).

As the colony prospered and human populations multiplied, the demand for products provided from deer grew as well. The unregulated market hunting that was occurring and the destruction of habitat (deforestation) caused deer populations to decline drastically throughout the 1700s. Market hunters sold deer meat to colonists and shipped deer hides to England's large leather industry. As settlements expanded across the state during the 1800s, deer populations dwindled rapidly and reached a low in the state in the early 1900s. At the beginning of the century, only 300,000 to 500,000 white-tailed deer survived in the United States. Alarmed at this decline, Congress passed the Lacey Act in 1900 regulating interstate commerce in wildlife. At last the day of the market was over (Osborne 1993).

Since the birth of wildlife management in the early 1900s, North Carolina's deer population has steadily expanded. In 1927 North Carolina made the harvest of doe deer illegal by enacting its first buck law. The period from 1930 to 1960 was characterized by the restoration and recovery of deer herds in the state. The Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), passed by Congress in 1937, provided a source of funding to begin deer restoration programs and implement management and research activities by state wildlife agencies. Initial deer restoration effort began in 1937, but was soon halted by World War II. North Carolinas major restoration thus began in 1944, estimating the population to be 50,000 animals. When all unoccupied deer habitat was stocked, deer relocation efforts ended in the early 1960s. By the 1960s the statewide population was estimated at 250,000, with hunters harvesting 30,000 deer (Osborne 1993). Although the 30' – 60's were characterized as the restoration and recovery phase, the NCWRC did continue to relocate deer into the 80s.

Early hunting seasons of the 1930s and 1940s prohibited the taking of antlerless deer in order to allow for the continued growth and expansion of relocated deer herds. As deer numbers climbed and all deer habitat became populated, deer seasons and bag limits became more liberal. Across most of North Carolina, current deer seasons and bag limits encourage the harvest of antlerless deer in order to manage deer populations. At the same time these regulations encourage hunters to be more selective with antlered buck harvest (Osborne 1993).

Since white-tailed deer thrive in habitat that is composed of woods and openings, the expansion of housing developments into forests or onto farms often provides excellent white-tailed deer habitat. Home sites created in a wooded area also often produce habitat preferred by white-tailed deer. Open farm fields can become better deer habitat as new homeowners plant trees and shrubs on their bare home sites. Deer populations have escalated in some of these suburban landscapes where exceptional habitat is available and hunting is limited (E. Stanford, NCWRC, pers. Comm. 2005).

1.4.2 Ecology, Behavior and Population Status

The white-tailed deer is one of the most ubiquitous and well-known wild animals in North Carolina, and its large population has a huge effect on other kinds of wildlife and on the natural environment as a whole (E. Stanford, NCWRC, pers. Comm. 2005). In North Carolina, the average harvested adult male (buck) weighs 123 pounds (102 pounds field dressed) and stands about 33 inches at the shoulder. A typical deer is 70 inches from the tip of its nose to the base of its tail. Females (does) are smaller and weigh less than males. Deer weights vary considerably, depending on age, sex, diet, location within the state, and season of the year (E. Stanford, NCWRC, Pers. Comm., 2005).

Male deer have antlers that are made of bone and are connected to the skull. Antlers begin developing in March or April. They are covered by a layer of skin, the velvet, richly supplied with nutrient-carrying blood vessels. In August or early September, antler growth stops, the velvet is shed, and the buck carries his antlers throughout the fall breeding season. As the buck's testosterone levels dwindle, a separation layer forms between the antlers and skull. In January or February, and sometimes as early as late December, the antlers fall off and the buck grows new antlers each year (E. Stanford, NCWRC, Pers. Comm., 2005). Antler growth is based on several factors; genetics, age of the deer, and food quantity and quality. Typically, bucks with larger antlers are more pleasing to the public for aesthetic reasons or for recreational purposes.

Deer are strictly plant eaters (including mushrooms). Deer eat leaves and twigs from a vast assortment of woody plants, including dogwood, maple, oak, willow, greenbriar, honeysuckle, grape, blackberry, and rhododendron (E. Stanford, NCWRC, Pers. Comm., 2005). Deer grub out the corms of ferns, nibble on lichens, strip bark from trees, and consume lily pads and pond plants. Deer eat garden vegetables, wild mushrooms, fruits such as apples and pears, and crops, including soybeans, corn, and alfalfa. Acorns are a favorite food, and deer consume them in great quantities when putting on fat for winter. A deer will eat 5 to 9 pounds of food daily (Fergus 2000)

Deer primarily breed from October to January. The rut peaks in mid- to late November, and most adult females have been bred by the end of December. Most does bear their fawns from May to early June, after approximately two hundred days of gestation. Yearling does may have one fawn, and older does generally have twins and, sometimes, triplets. Fawns weigh 4 to 8 pounds at birth. They nurse almost immediately and can walk within an hour (E. Stanford, NCWRC, Pers. Comm., 2005).

An ideal habitat is brush-stage forest with a wide variety of tree and plant species. White-tailed deer are highly adaptable and live in many habitats, including woodlots in farming country, suburbs, and deep woods. Some deer live out their entire lives in a home range averaging approximately 640 acres. Depending on the habitats resources, their home range may be more in areas with marginal habitat. In addition, studies have shown that yearling males typically disperse and establish a new home range (E. Stanford, NCWRC, Pers. Comm., 2005). Mature bucks usually have larger home ranges than those of does and younger deer (Fergus 2000).

The biological carrying capacity (BCC) of a wildlife population is defined as the maximum number of animals that an area can support without degradation to the animal's health and the environment over an extended period of time. When this number is exceeded, the health of the

population begins to suffer, reproduction declines, parasitism and disease increase, and habitat quality and diversity decrease due to overbrowsing of plant species preferred as food by deer (Kroll et al. 1986). Overbrowsing negatively impacts the habitat and landscape, and overall animal health declines due to less nutritious food items being available.

The cultural carrying capacity (CCC) is defined as the maximum density of a given species that can coexist compatibly with the local human population (Decker and Purdy 1988). This term is useful because it defines when conflicts with deer have exceeded an acceptable level, and provides managers with a target for establishing management objectives. Certain factors may influence the CCC, such as landscape or vegetation impacts, threats to public safety, the potential for illegal killing of deer, and personal attitudes and values. The threshold of wildlife damage acceptance is a primary limiting factor in determining the CCC.

For any given damage situation, there will be varying acceptance thresholds by those directly, as well as indirectly, affected by the damage. Both the CCC and BCC are important factors in managing conflicts between humans and deer.

In 2004, the estimated pre-hunt population of white-tailed deer in North Carolina was approximately 1 to 1.1 million animals (NCWRC 2005). The North Carolina white-tailed deer population is estimated by population modeling, which includes harvest trend analysis, and monitoring vital statistics of the deer herd. Currently, North Carolina deer populations statewide, including the three regional populations (Coast, Piedmont, Mountains) are stable, with populations increasing/decreasing in a few select management zones (E. Stanford, NCWRC, Pers. Comm., 2005).

1.4.3 Harvest Information for Deer in North Carolina

Deer hunting regulations, in North Carolina, vary throughout the State by county according to the deer management location, time of year, arms and ammunition, and age of the hunter. The following is a break-down of the 2004-2005 white-tailed deer hunting seasons in North Carolina.

DEER SEASONS

Locations	Type of Season	Dates
Eastern Deer Season	Bow and Arrow: Muzzle-loading: Gun:	*September 11- October 8* *October 9 - 15* *October 16 - January 1*
Central Deer Season	Bow and Arrow: Muzzle-loading: Gun:	*September 11 - November 5* *November 6 - 12* *November 13 - January 1*

Western Deer Season	Bow and Arrow: Muzzle-loading: Gun:	*September 13 - October 9 and October 18 - November 20* *October 11 - 16* *November 22 - December 11*
Northwestern	Bow and Arrow: Muzzle-loading: Gun	*September 11 - November 12* *November 13 - 19* *November 20 - December 18*
Sandhills Game Lands (3 days per week)	Bow and Arrow: Muzzle-loading: Gun: Field Trial Area:	*September 11 - November 5* *November 6 - 10* *November 13 - December 18* *November 15 - 27*
Gun: Either-Sex Seasons	Introductory Season: Conservative Season: Moderate Season: Maximum	*Last open day of the applicable Gun season.* *Last six open days of the applicable Gun season.* *First six open days and last six open days of the applicable Gun season.* *All open days of the applicable Gun season.*
Belews Creek Youth Hunt	Special Either-Sex Youth	*October 2*
Mountain Island State Forest	Special Either-Sex Youth	*October 16*

General Restrictions

- Visible antlers are defined as bony structures that protrude through the skin. Knobs or buttons covered by skin or velvet are not considered visible antlers.

- It is unlawful to carry any type of firearm while bow-and-arrow hunting during the bow-and-arrow seasons.
- Dogs may not be used for hunting deer during the bow-and-arrow or the muzzleloading firearm deer seasons.
- Pistols may not be carried while hunting deer during the muzzleloading firearm season.
- During the muzzleloading firearm season, only muzzleloading rifles or muzzleloading shotguns may be used. Bows and arrows are not permitted to be used during the muzzleloading firearm seasons, except on areas designated and posted as "Archery Zones" on game lands.
- During the gun deer season, bows and arrows, pistols (as defined under manner of taking in digest) and muzzleloading firearms are legal weapons.

Bag Limits

- In the Central region deer season where deer hunting with dogs is allowed and in all of the Eastern region seasons, the daily limit is two deer and the season limit is six deer, two of which must be anterless. In all other areas the daily limit is two deer and the season limit is six deer, four of which must be anterless. The possession limit is the same as the season limit in all areas of the state.
- Anterless deer harvested under the Deer Management Assistance Program (DMAP) are not included in normal statewide bag limits. Hunters on these areas must follow the harvest restrictions prescribed in the DMAP.
- Note: Anterless deer may be taken only in those areas and during those times described elsewhere in the North Carolina Regulations Digest (http://www.ncwildlife.org).

Either-Sex Deer Seasons

Bow-and-Arrow Deer Season

- Deer of either sex may be taken during the bow-and-arrow deer season in all areas (includes game lands).

Muzzleloading Firearm Deer Season

- Deer of either sex may be taken during the last day of muzzleloading firearm deer season in and west of Henderson, Buncombe, Yancey, Mitchell, Avery, and Watauga counties (includes game lands).
- Deer of either sex may be taken any time during the muzzleloading firearm deer season in and east of Rutherford, McDowell, Burke, Caldwell, Polk, Wilkes and Ashe counties (includes game lands).

Gun Either-Sex Deer Season

- Deer of either sex may only be taken during the gun season during those dates indicated. Most gun either-sex seasons fall under one of the following categories in North Carolina: - *Maximum:* Either-sex harvest is allowed the entire gun season; *Moderate*: Either-sex harvest is allowed the first six open days and the last six open days of the regular gun season; *Conservative* – Either-sex is allowed the last six open days of the regular gun season; *Introductory* – Either-sex is allowed the last open day of the regular gun season.

During the 2004-2005 North Carolina deer hunting seasons, hunters reported a harvest of 140,311 deer which was an increase from the 134,507 deer reported during 2003-2004. The antlered harvest was 76,840 and the antlerless harvest was 63,471. Bow hunters took 7,954 deer (3,564 antlered and 4,390 antlerless), 5.7% of the total reported harvest. Firearm hunters took 118,356 deer (64,458 antlered and 53,898 antlerless), 84.4% of the total reported harvest; and muzzleloader hunters harvested 14,001 deer (8,818 antlered and 5,183 antlerless) approximately 10.0% of the total reported harvest. In addition, the NCWRC estimates the total hunter harvest (reported and non-reported harvest) during the 2003/2004 and 2004/2005 hunting seasons at 207,250 and 214,172 deer, respectively (E. Stanford, NCWRC, Pers. Comm. 2005).

1.4.4 Deer Damage to Agriculture

According to technical assistance requests received by WS (Table 1-1), agricultural crops lost to deer depredation have included, but are not limited to, snap beans, sweet corn, leafy vegetables, tomatoes, peppers, and apples. Requests were also received for grain crops, including corn (silage and grain), soybeans, wheat, and oats. Currently, the North Carolina Department of Agriculture and the NCWRC does not keep documented records on the economic losses resulting from deer depredation to agricultural crops.

1.4.5 Deer-Vehicle Collisions

Deer-vehicle collisions are a serious concern nationwide because of losses to property and the potential for human injury and death (Conover 1997, Conover et al. 1995, Romin and Bissonette 1996). Conover et al. (1995) estimated that 1.5 million deer-vehicle collisions occur each year in the United States and that the average cost to repair the vehicle after a collision with a deer was $1,500. Conover et al. (1995) estimated that the total damage to vehicles in the United States each year from deer-vehicle collisions is greater than $1 billion. Additionally, Conover et al. (1995) estimated that deer-vehicle collisions in the United States result in 29,000 injuries and 211 human fatalities annually. Nationwide Insurance (1993) estimated that 120 people are killed annually in animal-vehicle accidents in the United States.

In North Carolina, the statewide number of reported deer-vehicle collisions for 2003 was 15,456 incidents (Tucker 2004). Often, deer-vehicle collisions in which a deer carcass was not recovered or little vehicle damage occurred go unreported. A Cornell University study estimates that the actual number of deer-vehicle collisions could be as high as six times the reported number (Decker et al. 1990).

1.4.6 Deer Hazards at Airports

Airports provide ideal conditions for feeding and bedding sites for deer due to the large grassy areas adjacent to brushy, forested habitat used as noise barriers. Deer living within airport boundaries are usually protected from hunting and many other human disturbances.

Deer are currently regarded as the number one hazardous wildlife species to aircraft across the nation (Dolbeer et al. 2000) and caused damage to aircraft in 86 percent of the strikes where deer were involved (Wright 2001). In general, deer strikes result in major component damage to the aircraft. Deer-aircraft strikes can also result in loss of human life, injury to passengers or people on the ground, and damage or malfunction of aircraft, aircraft navigational aids, or airport facilities. Mammals colliding with aircraft during the most vulnerable phases of flight, takeoff or landing, can cause the aircraft to crash or sustain physical damage (USDA 1998). Deer are characteristically unpredictable in their initial response to approaching aircraft. Deer may wander onto runway surfaces and be startled into the path of oncoming aircraft, and at night, they may freeze when caught in the beams of landing lights, resulting in a strike. The majority of deer strikes occur at night and in the fall during the mating season (Dolbeer et al. 1995).

White-tailed deer are a commonly encountered problem at airfields in North Carolina, threatening the safe operation of aircraft. Collisions between deer and aircraft can cause major damage to the aircraft, and has the potential to cause injury and loss of human life (S.Good, USDA-WS, Pers comm., 2005). Serious consequences are also possible if pilots loose control of the aircraft while attempting to avert a collision with deer. During the 1990's, numerous documented hazards were associated with white-tailed deer use of the runway system at a North Carolina based air station. The majority of deer/aircraft incidents at this station occurred during late summer through autumn. The Wildlife Hazard Assessment performed at Cherry Point, NC documented that white-tailed deer continue to be a severe threat to aviation safety (Begier 2002).

The risk that deer pose to aircraft is well documented. From 1990 through 2000 there were 500 reported deer-aircraft strikes to civil aircraft in the U. S. (reporting is not mandatory and it is estimated that less than 20% of strikes are reported) (USDA 1998). The following are just a few examples of deer/aircraft strikes that have occurred in the U.S. since 1990:

- On November 17, 1998, a private jet with 30 passengers was departing from Elko Nevada, when the bottom of the engine cowling struck a white-tailed deer, knocking off an antler. The entire antler was sucked into the engine forcing the plane to circle the airfield and land. The passengers were safely off-loaded, but the engine was destroyed. Damage was estimated at $300,000 (USDA 1998).

- On March 2, 1998, a Jetstream commuter in Johnstown, Maryland, collided with multiple white-tailed deer which caused the left main mount to collapse and the aircraft to lose control and roll off the runway with ten passengers and crew on board. The incident required emergency procedures and demonstrated the seriousness of the deer-aircraft collision hazard to public safety (USDA 1998).

- On January 11, 1990, a Hawker Siddeley struck several deer during take off in Tennessee. One of the deer was completely ingested into the left engine. The impact

tore the engine loose from the aircraft. The aircraft was replaced at a cost of 1.4 million dollars (Cleary et. al 2002).

- On January 2, 1992, a Piper 28 in Minnesota collided with a deer just prior to touchdown. The pilot added power and aborted the landing. Loss of engine power was experienced during the climb and the aircraft crashed into trees then the ground a ¼ mile south of the airport. The pilot was seriously injured and the aircraft was destroyed (Cleary et. al 2002).

- On December 6, 2000, an Embraer 120 in West Virginia collided with two deer just after landing. The tip of a propeller blade separated and punctured the fuselage, injuring a passenger, who later died (Cleary et. al 2002).

- On January 14, 2001, a Learjet60 in Alabama collided with two deer and ran off the end of the runway into a ditch because the thrust reversers would not operate. The aircraft burst into flames. Rescuers kept the fire from reaching the pilots for about 40 minutes until they could be removed. The pilot and first officer had serious injuries and were flown to a hospital. The aircraft was destroyed and cost $9.5 million to replace it; other costs were $25,000 (Bird Strike Committee 2005).

Bird and mammal strikes to aircraft have been reported in all 50 states. Nationwide, from January 1990-May 2005, the Federal Aviation Administration (FAA) received reports of 1,516 mammal strikes, 21 of which resulted in 31 human injuries and 1 fatality. Deer accounted for 17 of the 21 strikes that caused injuries. Nationwide, from January 1990-May 2005, there were 666 deer-aircraft strikes (626 strikes involved white-tailed deer) reported to civil aircraft that resulted in damage, with reported costs of civil aircraft strikes by white-tailed deer totaling $23,992,006 (FAA 2005). It is important to note that the majority of damaging deer strikes (67%) did not include the cost of damage in their report, thus the cost is probably much higher. In North Carolina, from Janurary 1990-May 2005 a total of 1,141 bird/wildlife strikes to civil aircraft was reported to the FAA, with 25 of these strikes reported to be caused by mammal species. Of the 25 mammal strikes, 21 of the strikes involved white-tailed deer, with reported costs totaling $398,962 (FAA National Wildlife Strike Database 2005).

1.4.7 Damage to Landscaping and Natural Resources

Deer are considered a "keystone species," one that can have a profound impact on vegetation, altering species composition to the point that entire forests either fail to regenerate, or regenerate with tree species that are not beneficial for deer or other species of wildlife, or for lumber (Wallingford 2002). Deer browsing damages and destroys landscaping and ornamental trees, shrubs, and flowers. As rural areas are developed, deer habitat may actually be enhanced because fertilized lawns, gardens, and landscape plants serve as high quality sources of food (Swihart et al. 1995). Furthermore, deer are prolific and adaptable, characteristics that allow them to exploit and prosper in most suitable habitat near urban areas, including residential areas (Jones and Witham 1990). The succulent nature of many ornamental landscape plants, coupled with high nutrient contents from fertilizers, offers an attractive food source for deer. In addition to browsing pressure, male white-tailed deer damage ornamental trees and shrubs by antler rubbing which results in broken limbs and bark removal. While large trees may survive antler-

rubbing damage, smaller saplings often die or become scarred to the point that they are not aesthetically acceptable for landscaping.

Deer overabundance can affect native vegetation and natural ecosystems in addition to ornamental landscape plantings. White-tailed deer selectively forage on vegetation (Strole and Anderson 1992), and thus can have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). These changes can lead to adverse impacts on other wildlife species, which depend on these plants for food and/or shelter. Numerous studies have shown that over browsing by deer can decrease tree reproduction, understory vegetation cover, plant density, and plant diversity (Warren 1991). By one count, 98 species of threatened and endangered plants, many of them orchids and lilies, are disturbed by deer browsing (Ness 2003). In the Great Smokey Mountains National Park in Tennessee, an area heavily populated by deer had a reduction in the number of plant species, a loss of hardwood species and a predominance of conifer species compared to an ecologically similar control area with fewer deer (Bratton 1979). In a single park in Columbus, Ohio, a deer herd eradicated more than 150 plant species (Ness 2003).

The alteration and degradation of habitat from over-browsing by deer can have a detrimental effect on deer herd health and may displace other wildlife communities (e.g., neotropical migrant songbirds and small mammals) that depend upon the understory vegetative habitat destroyed by deer browsing (VDGIF 1999). Similarly, DeCalesta (1997) reported that deer browsing affected vegetation that songbirds need for foraging surfaces, escape cover, and nesting. Species richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer densities (DeCalesta 1997). Intermediate canopy-nesting birds declined 37% in abundance and 27% in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that 3 species of birds were lost in a research preserve stocked with high densities of ungulates and that the densities of several other species of birds were lower than in an adjacent area with lower deer density. Waller and Alverson (1997) hypothesize that by competing with squirrels and other fruit-eating animals for oak mast, deer may further affect many other species of animals and insects.

1.4.8 Threats to Human and Livestock Health and Safety from Disease Transmission

Lyme Disease: Currently, the most common zoonosis involving deer is Lyme disease, caused by the spirochete *Borrelia burgdorferi* and vectored to humans by the deer tick (*Ixodes dammini* in the eastern U.S.) (Conover 1997). Initial symptoms of Lyme disease include a flu-like illness with headache, fever, muscle or joint pain, neck stiffness, swollen glands, jaw discomfort, and inflammation of the eye membranes (McLean 1994). If left untreated, heart, nervous system, and joint manifestations may develop (McLean 1994).

Research has shown a correlation between infected ticks, deer numbers, and Lyme disease cases (Deblinger et al. 1993, Magnarelli et al. 1984). Deer are an important reservoir for Lyme disease and are the primary host for the adult deer tick (Conover 1997). From 2004-2005, a total of 9,830 cases of Lyme disease in the United States was reported to the Center for Disease Control (CDC 2005). A total of 6,620 of these cases was from the Mid Atlantic region, consisting of

upstate New York, New York City, New Jersey, and Pennsylvania (CDC 2005). In North Carolina from 2004-2005, there were 73 reported cases of Lyme disease (CDC 2005).

According to Dr. Nolan Newton of the North Carolina Public Health Pest Management Section (N. Newton, NCDENR, Pers Comm., 2005), some of the best methods to prevent tick bites are to:

- avoid high grass and shrubs, and transition areas between fields and woods
- use DEET repellents on skin and permethrin repellents on clothing
- wear long pants, and tuck pants legs into sock tops, or tape pants legs to sock tops
- tuck your shirt tail into your pants at the waist
- check yourself and your children at least every 6 hours for ticks, if outdoors.
- prompt tick removal is critical
- check all over body, but check back of neck and behind ears very thoroughly
- pets can bring ticks indoors too, so check them throughly

In 1986, another serious tick-borne zoonosis, human ehrlichiosis, was discovered in the United States (McQuiston et al. 1999). Two distinct forms of the illness may affect humans: human monocytic ehrlichiosis (HME) and human granulocytic ehrlichiosis (HGE) (McQuiston et al. 1999, Lockhart et al. 1997). The bacterial agents that cause ehrlichiosis are transmitted to humans by infected ticks that acquire the agents from feeding on infected animal reservoirs (McQuiston et al. 1999). Ehrlichiosis in humans may result in fever, headache, myalgia, nausea, and occasionally death (McQuiston et al. 1999, Little et al. 1998). HME is the type of ehrlichiosis predominantly found in the southeastern, south-central, and mid-Atlantic U.S. White-tailed deer are major hosts for *Amblyomma americanum*, the tick that transmits HME, and deer have been identified as a reservoir for HME (Little et al. 1998, Lockhart et al. 1997).

Bovine Tuberculosis: Tuberculosis is a contagious disease of both animals and humans and can be caused by three specific types of the Mycobacterium bacteria. Bovine TB, caused by *Mycobacterium bovis,* primarily affects cattle and other bovine-like animals (e.g., bison, deer, and goats) but can be transmitted to humans and other animals.

Pathogenesis of *M. bovis* infection in white-tailed deer begins with either inhalation or ingestion of infectious organisms. Transmission is aided by high deer density and prolonged contact, as occurs at supplemental feeding sites. The bacilli commonly invade the tonsil first, later spreading to other cranial lymph nodes. If the infection is contained, it spreads no further. In some animals the infection spreads to the thorax where it may disseminate throughout the lungs; these animals may then shed the bacteria by aerosol or oral secretions. The most susceptible animals develop disseminated infections throughout their abdominal organs, and can even shed bacilli through their feces or through their milk to their fawns.

Bovine TB has affected both animal and human health for years. During the early part of the 20th century the disease affected more U.S. farm animals than did all other infectious diseases combined. The United States Department of Agriculture (USDA) Cooperative State-Federal Tuberculosis Eradication Program, which began in 1917, is chiefly responsible for the near-eradication of the disease from the nation's livestock population.

The only state with documented significant levels of Bovine TB in white-tailed deer is Michigan. This high rate of TB in Michigan is due to an artificially high density of deer in close association at winter food dumps provided for the deer herds. High deer densities most often occur when the amount of naturally available foods is supplemented, such as in urban or suburban environments or in cases such as Michigan.

Foot and Mouth Disease: There are no known cases of Foot and Mouth Disease in the United States. Foot and Mouth Disease is a highly contagious viral disease that affects domestic cattle, sheep, pigs, and goats. Deer are a known vector of this disease.

The disease causes blisters which produces chronic lameness, weight loss, and decreased production, and can cause abortions and sterility. The incubation period for foot and mouth is 2 to 16 days. It is rarely fatal; however, it can cause severe economic losses from reduced production and the ability to export products (CDC 2003).

Chronic Wasting Disease: Chronic wasting disease (CWD) is a neurological disease found only in cervids (members of the deer family) in North America. The disease belongs to a family of diseases known as transmissible spongiform encephalopathies (TSE). The disease attacks the brain of infected animals and produces small lesions that result in death. Since 1999, the North Carolina Wildlife Resources Commission has collected tissue samples from almost 2,400 captive and wild deer across the state. CWD has not been detected in any North Carolina samples. In 2002, concerned about the rapid spread of CWD in western states, the NCWRC moved to strengthen regulations for captive deer and elk herds here. New requirements included tagging of animals, minimum fence heights and restrictions on the importation and transportation of deer and elk. These tighter controls enable the Commission to track captive animals better and to reduce the risk of disease spreading if an animal became infected (NCWRC, North Carolina Deer Remain Free of Chronic Wasting Disease, 2005).

CWD has been identified in captive or wild deer or elk in Colorado, Wisconsin, Nebraska, Kansas, Montana, South Dakota, New Mexico, Utah, Illinois, New York, West Virginia, Wyoming, Minnesota, and Oklahoma as well as in the Canadian province of Saskatchewan and Alberta.

North Carolina WS submits a percentage of the deer killed during damage management activities for CWD testing. This testing could be expanded to testing for TB, Foot and Mouth Disease, and Hemorrhagic disease at the request of the NCWRC.

1.4.9 WS RECORD KEEPING REGARDING REQUESTS FOR DEER DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from Wildlife Services. It is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exists.

The database includes, but is not limited to, the following information: species of wildlife involved, the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 1-1 provides a summary of Technical Assistance projects completed by the North Carolina WS program for Fiscal Years 1999-2004. A description of the WS Direct Control and Technical Assistance programs is contained in Chapter 3 of this EA.

Table 1-1*. Annual number of incidents for technical assistance involving white-tailed deer for North Carolina Wildlife Services during 1999-2004.

Fiscal Year	Agriculture	Human Health and Safety	Property	Natural Resources	Total
1999	0	0	1	0	1
2000	1	0	5	0	6
2001	0	0	1	0	1
2002	0	6	0	0	6
2003	0	17	20	0	37
2004	5	2	12	0	19

*Data presented in this table were taken from NC WS Annual Program Reports and represent the number of technical assistance projects conducted by the NC WS program and do not include data from operational projects conducted during the time period covered

1.5 Operational Framework for Deer Damage Management in North Carolina

The potential for deer populations to exceed carrying capacity can negatively effect plant and animal species, conflict with land-use practices, and increase risk to human health and safety, any of which would necessitate effective deer damage management. Financial and logistical constraints require that deer management programs be practical and fiscally responsible.

1.5.1 Wildlife Services Objectives

- In consultation with the NCWRC, respond to requests for assistance with the appropriate action (technical assistance or direct control) as determined by North Carolina WS personnel, applying the ADC Decision Model (Slate et al. 1992).

- Hold the lethal take of non-target animals by WS personnel during deer damage management to zero.

1.5.2 Relationship of this EA to Other Environmental Documents

Wildlife Services Programmatic Environmental Impact Statement. WS conducted a NEPA process and developed a Final Environmental Impact Statement (FEIS) on the national APHIS/WS program (USDA 1997). The FEIS contains detailed discussions of potential environmental impacts from various wildlife damage management methods. Pertinent information available in the FEIS has been incorporated by reference into this EA. The FEIS may be obtained by contacting: USDA APHIS WS Operational Support Staff, 4700 River Rd., Unit 87, Riverdale, MD 20737-1234.

1.5.3 Decisions to be Made

Based on the scope of this EA, the decisions to be made are:

- Should WS conduct white-tailed deer damage management in North Carolina to alleviate damage to agriculture, property, natural resources, and human health and safety?
- Should WS implement an integrated wildlife damage management strategy, including technical assistance and direct control, to meet the need for white-tailed deer damage management in North Carolina?
- If not, should WS attempt to implement one of the alternatives to an integrated damage management strategy as described in the EA?
- Would the Preferred Alternative have significant impacts on the quality of the human environment requiring preparation of an EIS?

1.6 Scope of this Environmental Assessment Analysis

1.6.1 Actions Analyzed

This EA evaluates white-tailed deer damage management by WS to protect human health, human safety, property, natural resources and agriculture on private land or public facilities whenever or wherever such management is requested from the WS program in North Carolina.

1.6.2 American Indian Lands and Tribes

Currently WS does not have any MOUs or signed agreements with any American Indian tribe in North Carolina. If WS enters into an agreement with a tribe for white-tailed deer damage management, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA.

1.6.3 Period for which this EA is Valid

This EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of WS state white-tailed deer damage management activities.

1.6.4 Site Specificity

This EA analyzes the potential impacts of white-tailed deer damage management and addresses activities on all private and public lands in North Carolina under MOU, Cooperative Agreement, and in cooperation with the appropriate public land management agencies. It also addresses the impacts of deer damage management on areas where additional agreements may be signed in the future. Because the Preferred Alternative is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional wildlife damage management efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of deer damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. Although some of the sites where deer damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever deer damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in North Carolina. (See Description of Alternatives for a description of the Decision Model and its application).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within North Carolina. In this way, APHIS-WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

1.6.5 Public Involvement/Notification

As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.7 Authority and Compliance

1.7.1 Authority of Federal and State Agencies in White-tailed Deer Damage Management in North Carolina

See Chapter 1 of USDA (1997) for a complete discussion of federal laws pertaining to WS.

1.7.1.1 WS Legislative Authority

The USDA is authorized by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services

program is the Act of March 2, 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468), and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, Public Law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 U.S.C. 426c), and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767), which provides that:

> *The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."*

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing "*bringing (damage) under control*," rather than "*eradication*" and "*suppression*" of wildlife populations. In 1988, Congress strengthened the legislative authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with states, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."*

1.7.1.2 The North Carolina Wildlife Resources Commission (NCWRC) Legislative Authority

The North Carolina Wildlife Resources Commission is specifically charged by the General Assembly with the management of the state's wildlife resources (N.C.G.S. § 143-239). The primary statutory authorities include the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in North Carolina (N.C.G.S. § 113-131) (N. Young, NCWRC, Pers. Comm., 2005).

The NCWRC has authority to manage deer in the State of North Carolina Pursuant to N.C.G.S. §113-274(c)(1a). The NCWRC has the authority to permit the taking of deer to resolve damage problems covering this proposed action. The authority for management of resident wildlife species is the responsibility of the NCWRC, and deer are classified as big game (N.C.G.S. § 113-129(1b)) (N. Young, NCWRC, Pers. Comm., 2005).

1.7.1.3 The North Carolina Department of Agriculture Legislative Authority

The Pesticide Regulation Section of NCDA enforces state laws pertaining to the use and application of pesticides. Under the North Carolina Pesticide Applicators Law this Section monitors the use of pesticides in a variety of pest management situations. It also licenses private and commercial pesticide applicators and pesticide contractors. Under the North Carolina Pesticide Applicators Law the Section licenses restricted use pesticide dealers and registers all pesticides for sale and distribution in the State of North Carolina (M. Mitchell, NCDA, Pers. Comm., 2005).

1.7.2 Compliance with Other Federal Laws

Several other federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

1.7.2.1 National Environmental Policy Act (NEPA)

WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in North Carolina. When WS direct management assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS could agree to complete NEPA documentation at the request of the other federal agency.

1.7.2.2 Endangered Species Act (ESA)

It is federal policy, under the ESA, that all federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). WS obtained a Biological Opinion (B.O.) from the U.S. Fish and Wildlife Service (USDI 1992) describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS is in the process of initiating formal consultation at the programmatic level to reevaluate the 1992 B.O. and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 USFWS BO.

1.7.2.3 National Historic Preservation Act (NHPA) of 1966 as amended

The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that has the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties.

Each of the deer damage management methods described in this EA that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In

general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

There is potential for audible effects on the use and enjoyment of a historic property when methods such as firearms, or other noise-making methods are used at or in close proximity to such sites for purposes of hazing or removing animals. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

1.7.2.4 Environmental Justice and Executive Order 12898—*"Federal Actions to Address Environmental Justice in Minority Populations and Low Income Population"* Executive Order 12898, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental justice is a priority within APHIS and WS. Executive Order 12898 requires Federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minorities and persons or populations of low income. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. It is not anticipated that the Preferred Alternative would result in any adverse or disproportionate environmental impacts to minorities and persons or populations of low income. Additionally, the donation of venison to charitable organizations would be a benefit to the economically disadvantaged, and to other persons in need.

1.7.2.5 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. The proposed white-tailed deer damage management program would occur by using

only legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

1.7.2.6 The Native American Graves and Repatriation Act of 1990.
The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

1.7.2.7 Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360).
This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the Food and Drug Administration.

1.7.2.8 Controlled Substances Act of 1970 (21 U.S.C. 821 et seq.).
This law requires an individual or agency to have a special registration number from the federal Drug Enforcement Administration (DEA) to possess controlled substances, including those that are used in wildlife capture and handling.

1.7.2.8 Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA).
The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs. Those requirements are: (1) a valid "veterinarian-client-patient" relationship, (2) well defined record keeping, (3) a withdrawal period for animals that have been administered drugs, and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under the proposed action. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (i.e., a period of time after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that might be consumed by a human within the withdrawal period must be identified; the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies has recommended that suitable identification markers include durable ear tags, neck collars, or other external markers that provide unique identification (WWHC undated). APHIS-WS establishes procedures in each state for administering drugs used in wildlife capture and handling that must be approved by state veterinary authorities in order to comply with this law.

CHAPTER 2: AFFECTED ENVIRONMENTS AND ISSUES

2.1 Affected Environments

The areas of the proposed action include, but are not limited to, property on or adjacent to airports, recreational areas, parks, corporate complexes, subdivisions, businesses, industrial parks, schools, agricultural areas, and cemeteries. The proposed action may be conducted on properties held in private, local, state or federal ownership.

2.1.1 Airports

Of all mammal species, deer are ranked as the most hazardous to aircraft, especially to smaller general aviation aircraft (Dolbeer et al. 2000), and they represent a serious threat to human health and safety. Airports are often secured areas with chain-link security fencing. Sometimes deer gain entrance into these airports where there is adequate cover and food, and they live there for all or part of the year. Because deer are ubiquitous throughout North Carolina, it is possible for deer to be present at nearly any airport in the state.

2.1.2 Properties where federal research laboratories are located

Federal properties containing research facilities are usually controlled access areas with security fencing. These same properties often are unconcerned with the presence of deer until the herd is large enough to impact the horticulture present and the health of the herd itself. When herds of unhealthy sizes occur on federal properties, USDA WS may be called upon to reduce their sizes.

2.1.3 Urban and suburban and rural areas

Other areas include farms and rural areas where deer are causing damage to agriculture through feeding and antler rubbing and potentially to livestock through the spread of disease. Public and private properties in rural and urban/suburban areas may also be affected where deer cause damage to landscaping, to natural resources, by vehicle collisions, and through threats to human health and safety from disease transmission.

2.1.4 The "Environmental Status Quo" for managing damage and conflicts associated with State managed or unprotected wildlife species

As defined by NEPA implementing regulations, the "*human environment* shall be interpreted comprehensively to include the natural and physical environment *and the relationship of people with that environment.*" (40 CFR 1508.14). Therefore, when a federal action agency analyzes its potential impacts on the "human environment," it is reasonable for that agency to compare not only the effects of the federal action, but also the potential impacts that occur or will occur in the absence of the federal action. This concept is applicable to situations involving federal assistance in managing damage associated with state-resident wildlife species or unprotected wildlife species.

Unprotected wildlife species, such as most non-native invasive species, are not protected under state or federal law. Most State-resident wildlife species are managed under State authority or law without any federal oversight or protection. In some states, with the possible exception of restrictions on methods (e.g., firearms restrictions, pesticide regulations), unprotected wildlife species and certain resident wildlife species are managed with little or no restrictions allowing them to be killed or taken by anyone at any time. For white-tailed deer damage management in

North Carolina, the NCWRC has the authority to manage and authorize the taking of white-tailed deer for damage management purposes (see section 1.7.1.2).

When a non-federal entity (i.e. State wildlife agencies, State agriculture agencies, State health agencies, municipalities, counties, private companies, individuals, etc.) takes a management action on a State-resident wildlife species or unprotected wildlife species, the action is not subject to NEPA compliance due to the lack of federal involvement in the action. Under such circumstances, the environmental *baseline* or *status quo* must be viewed as an environment that includes those species *as they are managed or impacted by non-federal entities in the absence of the federal action being proposed.* Therefore, in those situations in which a non-federal entity has decided that a management action directed towards a state protected or unprotected wildlife species will occur and even the particular methods that will be used, WS's involvement in the action will not affect the *environmental status quo*. WS's decision-making ability is restricted to one of two alternatives - either taking the action using the specific methods as decided upon by the non-federal entity, or taking no action at all at which point the non-federal entity will take the same action anyway.

The inability to change the *environmental status quo* in the types of situations described above presents a clear question of whether there is enough federal control over the action to be taken to make direct assistance by WS a federal action requiring compliance with the National Environmental Policy Act. This lack of federal control over the decision to be made is even clearer when the non-federal entity has committed to taking the same actions in the absence of any federal assistance from WS. Clearly, under these circumstances, by any analysis we can envision, WS would have virtually no ability to affect the *environmental status quo* by selecting any possible alternative, even the alternative of no federal action by WS.

Therefore, based on the discussion above, it is clear that in those situations where a non-federal cooperator has obtained the appropriate NCWRC permit or authority, and has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, however, certain aspects of the human environment may actually benefit more from WS's involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to selectively remove a target species than a non-WS entity; WS management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

2.2 Issues Analyzed in Detail

The following issues have been identified as areas of concern requiring consideration in this environmental assessment:

2.2.1 Effects on White-tailed Deer Populations

There are concerns that the Preferred Alternative or any of the alternatives would result in the loss of local white-tailed deer populations or could have a cumulative adverse impact on statewide populations. North Carolina WS expects that no more than 1,500 deer would be

lethally removed annually, under permits issued by the NCWRC, while conducting WS direct control activities within the state. However, in the event of a disease outbreak (Foot and Mouth or CWD) WS could kill up to 10,000 deer (at the request of the NCWRC). Therefore, 10,000 deer was used to analyze WS potential impacts to the statewide deer population in North Carolina. Using the 2003-2004 NCWRC estimated hunter harvest (207,250), the number of deer killed under NCWRC issued Deer Management Permits (569 in 2003), and the lethal take of 10,000 deer by WS (in case of a disease outbreak), the possibility of WS deer lethal take adversely affecting the overall North Carolina deer population (1 to 1.1 million) is considered low (1.0% of the overall populations and 4.8 % of the total lethal take). The cumulative take appears to be far beneath the level that would begin to cause a decline in the NC deer population.

2.2.2 Effects on Plants and other Wildlife Species, including Threatened and Endangered Species

There are concerns among members of the public and wildlife professionals, including WS, that there is the potential for control methods used in the Preferred Alternative or any of the alternatives to inadvertently capture or remove non-target animals or potentially cause adverse impacts to non-target species populations, particularly T&E species. Special efforts are made to avoid jeopardizing Threatened and Endangered Species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential impacts of deer damage management control methods on T&E species and has obtained a Biological Opinion. For the full context of the Biological Opinion, see Appendix F of the ADC FEIS (USDA 1997). WS's standard operating procedures include measures intended to mitigate or reduce the effects on non-target species populations and are described in other sections of this EA.

To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are as target-selective as possible or apply such methods in ways to reduce the likelihood of negatively effecting non-target species.

Some people are concerned about the damaging effects that deer are having on native flora and fauna, and on the recovery of state and federally listed Endangered and Threatened species, and species of concern. These people are concerned as to whether the Preferred Alternative or any of the alternatives would reduce such damage to acceptable levels.

2.2.3 Effects on Human Health and Safety

A common concern is whether the Preferred Alternative or any of the alternatives pose an increased threat to human health and safety. In particular, there is concern that the methods of deer removal (i.e., trapping and sharpshooting) may be hazardous to people. Another concern is that high deer populations pose a threat to human health and safety through the potential for deer-vehicle collisions, deer-aircraft collisions, and the spread of disease.

Firearm use is sensitive and a public concern because of safety issues relating to the public and firearms misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety-and-use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive

2.615). WS employees, who use firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

2.2.4 Humaneness of methods to be used

The issue of humaneness, as it relates to the killing or capturing of wildlife, is an important but complex concept. Kellert and Berry (1980) in a survey of American attitudes toward animals related that 58% of their respondents, "*. . . care more about the suffering of individual animals . . . than they do about species population levels.*" Schmidt (1989) indicated that vertebrate pest control for societal benefits could be compatible with animal welfare concerns, if "*. . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*"

Suffering has been described as a "*. . . highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "*. . . can occur without pain . . .*," and "*. . . pain can occur without suffering . . .* " (American Veterinary Medical Association (AVMA) 1986). Because suffering carries with it the implication of a time frame, a case could be made for "*. . . little or no suffering where death comes immediately . . .* " (California Department of Fish and Game 1991), such as the WS technique of shooting.

Defining pain as a component of humaneness may be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "*. . . probably be causes for pain in other animals . . .* " (AVMA 1986). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991). Some WS damage management methods such as traps, may thus cause varying degrees of pain in different animal species for varying time frames. At what point pain diminishes or stops under these types of restraint has not been measured by the scientific community.

Pain and suffering as it relates to a review of WS damage management methods to capture animals, has both a professional and lay point of arbitration. Wildlife managers and the public would both be better served to recognize the complexity of defining suffering, since "*. . . neither medical or veterinary curricula explicitly address suffering or its relief*" (CDFG 1991).

Research suggests that with some methods, such as restraint in traps, changes in the blood chemistry of trapped animals indicate "*stress*" (USDA 1997: 3-81). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

Thus, the decision-making process involves tradeoffs between the above aspects of pain and humaneness. An objective analysis of this issue must consider not only the welfare of wild animals but also the welfare of humans if damage management methods were not used. Therefore, humaneness appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in

coping with this issue is how to achieve the least amount of suffering with the constraints imposed by current technology and funding.

WS has improved the selectivity and humaneness of management devices through research and is striving to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some methods are used in those situations when non-lethal damage management methods are not practical or effective.

North Carolina WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology and funding. Standard Operating Procedures used to maximize humaneness are listed in this EA. As appropriate, WS euthanizes live animals by methods recommended by the AVMA (Beaver et al. 2001) or the recommendations of a veterinarian, even though the AVMA euthanasia methods were developed principally for companion animals and slaughter of food animals, and not for free-ranging wildlife.

2.2.5 Effects on Aesthetic Values

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception and today a large percentage of households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife.

There is some concern that the Preferred Alternative or the other alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use

in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

North Carolina WS recognizes that all wildlife has aesthetic value and benefit. WS only conducts deer damage management at the request of the affected home/property owner or resource manager. If WS received requests from an individual or official for deer damage management, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual damage management actions would be necessary. Management actions would be carried out in a caring, humane, and professional manner.

2.2.6 Effects on Regulated White-tailed Deer Hunting

Some people may be concerned that deer removal activities conducted by WS would affect regulated deer hunting by significantly reducing local deer populations. WS deer removal activities would primarily be conducted on populations and in areas where hunting access is restricted or has been ineffective. In fact, lethal, management pressure applied to deer in these populations could serve to drive deer from these areas to places accessible to hunters. Any movement of deer offsite and to areas accessible by hunters will likely be temporary in nature (i.e., deer will quickly return). Research shows that deer typically do not reestablish home ranges when lethal control is applied. Further, the magnitude of the impact WS's activities will have on the deer population is considered low (see section 4.2, Alternative 5).

2.3 Issues Not Considered in Detail With Rationale

2.3.1 WS' Impact on Biodiversity

No North Carolina WS deer damage management is, or will be, conducted to eradicate a native wildlife population. WS operates according to international, federal, and state laws and regulations enacted to ensure species viability. In addition, any reduction of a local population or group is frequently temporary because immigration from adjacent areas or reproduction replaces the animals removed. The impacts of the current WS program on biodiversity are minor and not significant nationwide, statewide, or region wide (USDA 1997). WS operates on a small percentage of the land area of the State, and the maximum WS take of any wildlife species analyzed in this EA is a small percentage (1.0% of the statewide deer population) of the total population and is insignificant to the viability and health of the population.

2.3.2 Appropriateness of Preparing an EA (Instead of an EIS) For Such a Large Area

Some individuals might question whether preparing an EA for an area as large as the State of North Carolina would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the Preferred Alternative would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State may provide a better analysis than multiple EA's covering smaller zones. In addition, North Carolina WS only conducts deer damage management in small areas of the State where damage is occurring or likely to occur.

CHAPTER 3: ALTERNATIVES

3.1 Introduction

This chapter consists of 6 parts: 1) an introduction, 2) description of alternatives considered and analyzed in detail including Alternative 5 (the Preferred Alternative), 3) a description of Integrated Wildlife Damage Management, 4) deer damage management methods available for use or recommendation by WS in North Carolina, 5) alternatives considered but not in detail, with rationale, and 6) standard operating procedures (SOPs) for deer damage management.

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), *"Methods of Control"* (USDA 1997, Appendix J), and the *"Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program"* (USDA 1997, Appendix P).

The five alternatives analyzed in detail are:

- Alternative 1 – No Deer Damage Management by WS
- Alternative 2 – Technical Assistance Only
- Alternative 3 – Lethal Deer Damage Management only by WS
- Alternative 4 – Non-lethal Deer Damage Management only by WS
- Alternative 5 – Integrated Deer Damage Management Program: No Action (Preferred Alternative)

3.2 Alternatives Considered, Including the Preferred Alternative

Alternative 1: No Deer Damage Management by WS

This alternative would eliminate WS involvement in all deer damage management activities in North Carolina. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own deer damage management without WS input.

Alternative 2: Technical Assistance Only

This alternative would only allow North Carolina WS to provide technical assistance to individuals or agencies requesting deer damage management. Individuals might choose to implement WS lethal and non-lethal recommendations, implement methods not recommended by WS, use contractual services of private businesses, or take no action. Appendix B describes methods available for recommendation by WS under this alternative.

Alternative 3: Lethal Deer Damage Management only by WS

Under this alternative, WS would provide only lethal direct control services and technical assistance. Requests for information regarding non-lethal management approaches would be referred to the North Carolina Wildlife Resources Commission, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS lethal direct control services, use contractual services of private businesses, or take no action. Appendix B describes lethal methods available for recommendation and use by WS under this alternative.

Alternative 4: Nonlethal Deer Damage Management only by WS
This alternative would require WS to use and recommend non-lethal methods only to resolve all deer damage problems. Requests for information regarding lethal management approaches would be referred to the North Carolina Wildlife Resources Commission, local animal control agencies, or private businesses or organizations. Persons incurring deer damage could still resort to lethal methods or other methods not recommended by WS, use contractual services of private businesses that were available to them, or take no action. Appendix B describes a number of non-lethal methods available for recommendation and use by WS under this alternative.

Alternative 5: Integrated Deer Damage Management Program: No Action (Preferred Alternative)
Under this alternative, Wildlife Services would continue the current damage management program that responds to requests for white-tailed deer damage assistance in the State of North Carolina. An IWDM approach would be implemented in consultation and coordination with the North Carolina Wildlife Resources Commission to alleviate white-tailed deer damage to agriculture, property, natural resources, and human health and safety on all private and public lands of North Carolina where a need exists, a request is received, and funding is available. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, white-tailed deer, other species, and the environment. Under this action, WS would provide technical assistance and operational damage management, including non-lethal and lethal management methods (see Appendix B) by applying the WS Decision Model (Slate et al. 1992). When appropriate, habitat modifications, harassment, repellants, and physical exclusion could be recommended and utilized to reduce deer damage. In other situations, deer would be removed as humanely as possible by sharpshooting and live capture followed by euthanasia under permits issued by the North Carolina Wildlife Resources Commission. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. Deer damage management would be conducted in the state, when requested, on private or public property after an *Agreement for Control* or other comparable document has been completed. All deer damage management would be consistent with other uses of the area and would comply with appropriate federal, state and local laws.

3.3 Deer Damage Management Strategies and Methodologies Available to WS

The strategies and methodologies described below include those that could be used or recommended under Alternatives 2, 3, 4, and 5 described above. Alternative 1 would terminate both WS technical assistance and operational deer damage management by WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.3.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective[2] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (i.e., restricting flying times, no feeding policy), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.3.2 Technical Assistance Recommendations

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. Technical assistance is generally provided following an on-site visit or verbal consultation with the requester. WS personnel provide technical assistance such as information, instructional sessions, demonstrations and advice on available deer damage management techniques. Technical assistance includes demonstrations on the proper use of management devices (pyrotechnics, exclusion devices, etc.), wildlife habits and biology, habitat management, exclusion, and animal behavior modification. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application. Technical assistance may require substantial effort by WS personnel in the decision making process, but the actual work is the responsibility of the requester.

Under APHIS NEPA Implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving wildlife damage problems.

3.3.3 Direct Operational Damage Management Assistance

This is the implementation or supervision of damage management activities by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when Agreements for Control or other comparable instruments provide for WS direct damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, if the problem is complex.

3.3.4 Education

Education is an important element of WS's program activities because wildlife damage management is about finding "balance" or co-existence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux.

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[2] The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns

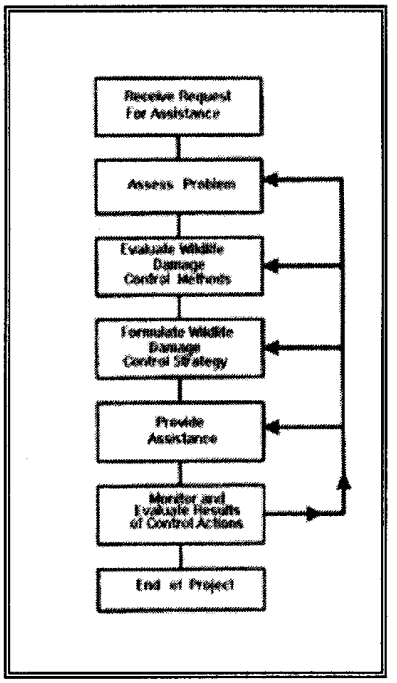
In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures and demonstrations are provided to farmers, homeowners, and other interested groups. WS frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are updated on recent developments in damage management technology, laws and regulations, and agency policies.

3.3.5 WS Decision Making

The procedures used by WS personnel to determine management strategies or methods applied to specific damage problems can be found in USDA 1997, Appendix N.

WS personnel use a methodical process for evaluating and responding to damage complaints and requests for assistance that are depicted by the WS Decision Model described by Slate et al. (1992) (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered nonlethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem and evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management may be ended. In some cases, continual conduct of effective wildlife damage management activities is necessary to relieve damage. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the ongoing damage management strategy. The Decision Model is not necessarily a written process, but a mental problem-solving process common to most, if not all professions.

Figure 3-1
WS Decision Model



3.3.6 Community-based Selection of a Deer Damage Management Program

Technical assistance provided by WS to resource owners for selection of a deer damage management program: The WS program in North Carolina follows the "Co-managerial approach" to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS provides technical assistance regarding the biology and ecology of white-tailed deer and effective, practical, and reasonable methods available to reduce deer damage to local requesters. This includes non-lethal and lethal methods. WS and other state and federal wildlife or wildlife damage management agencies may facilitate discussions at local community meetings when resources are available. Resource owners/managers and others

directly affected by deer damage or conflicts in North Carolina have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations. Local authorities decide which methods should be used to solve a wildlife/human conflict. These decision makers include community leaders, private property owners/managers, and public property owners/managers.

Community selection of a deer damage management program: The authority that selects damage management actions for the local community might be a mayor, city council, common council, park board, or for a homeowner or civic association would be the President or the President's or Board's appointee. These individuals are often times popularly elected residents of the local community who oversee the interests and business of the local community. These individuals would represent the local community's interest and make decisions for the local community or bring information back to a higher authority or the community for discussion and decision making. Identifying the authority that selects damage management actions for local business communities is more complex because the lease may not indicate whether the business must manage wildlife damage themselves, or seek approval to manage wildlife from the property owner or manager, or from a governing board. WS would provide technical assistance to the local community or local business community authority(ies) and recommendations to reduce damage. Direct damage management would be provided by WS if requested by the local community authority, funding was provided, and the requested direct damage management was consistent with WS recommendations, policy and federal and state laws.

Private property selection of a deer damage management program: When one person privately owns a parcel of property, the authority selecting the damage management plan would be him or herself. WS would provide technical assistance and recommendations to this person to reduce damage. If multiple property owners are affected and no homeowner or civic association represents the affected resource owners of the local community, then WS would provide technical assistance to the self or locally appointed authority(ies). Direct damage management would be provided by WS if requested, funding was provided, and the requested direct damage management was consistent with WS recommendations, policy and federal and state laws. The affected resource owners would include those receiving damage and those whose property is adjacent to the areas where the deer primarily inhabit or damage resources. Affected resource owners who disagree with the direct damage management may request WS not conduct this action on their property and WS will honor this request; unless, as according to State law, the NCWRC has an animal health emergency and has requested WS involvement.

Public property selection of a deer damage management program: The authority selecting the damage management plan for local, state, or federal property would be the official responsible for or authorized to manage the public land to meet interests, goals and legal mandates for the property. WS would provide technical assistance and recommendations to this person to reduce damage. WS would provide direct damage management if it was requested, funding was provided, and the requested direct damage management was consistent with WS recommendations, policy, and federal and state laws.

Summary for community selection of a deer damage management program: This process for involving local communities and local stakeholders in the decisions for deer damage management assures that local concerns are considered before individual damage management actions are taken.

3.4 Wildlife Damage Management Methods Recommended or Authorized for Use

USDA (1997, Appendix J) describes methods currently used by the WS program. Several of these were considered in this assessment because of their potential use in reducing deer damage to agriculture, property, natural resources, and public health and safety. A listing and more detailed description of the methods used by North Carolina WS for deer damage management is found in Appendix B of this EA.

3.4.1 Nonlethal Methods

Resource management: This method involves managing existing resources to discourage or eliminate the attractiveness of an area to deer or to minimize the likelihood that there will be conflict. Examples of this method include changes in human behavior (e.g., restructuring peak aircraft landing and takeoff times to avoid periods of high deer presence), habitat modification, livestock management, and modifying crop cultural practices (e.g., reducing vegetative cover, forage crops, or using less palatable landscape plants).

Physical exclusion: Fencing, netting, or other barriers can limit deer access to a particular area. There are several types of fences that can inhibit deer access including: temporary electric, high tensile electric, woven wire, chain-link, and solid wall fencing.

Behavior modification: The proper and integrated use of harassment techniques including auditory scaring techniques (pyrotechnics, propane exploders, electronic distress sounds, sirens, etc.) and visual scaring techniques (mylar ribbon, balloons, effigies, flashing lights, etc.) could help reduce conflicts.

Repellents: Repellents fall under two categories, contact repellants and area repellants. Contact repellents (Deer Away® and Miller's Hot Sauce®) are those repellents that are applied to vegetation to discourage deer from browsing. Area repellents (Hinder® and Ro-pel®) are designed to repel deer by odor alone.

3.4.2 Lethal Methods

Sharpshooting: This method requires selectively shooting deer from tree stands, vehicles, or vantage points. When possible, deer killed by WS are donated for processing and distribution to charitable food organizations.

Live-capture and euthanasia: In some areas sharpshooting may be inappropriate due to safety concerns. Capture methods for deer include: darting with capture drugs, clover traps, box traps, drop nets, and rocket nets. Captured deer would be euthanized by methods recommended by the AVMA (Beaver et al. 2001) or per the recommendations of a veterinarian.

Hunting programs: WS may recommend the use of state regulated firearm and archery deer hunting programs to reduce deer damage in a local area.

3.4.3 Examples of Past Deer Damage Management Projects Conducted by NC WS

North Carolina Wildlife Services has conducted operational deer damage management activities at sites that include civilian airports and Federal properties. The following are examples of past/ongoing WS deer damage management projects that have been conducted in North Carolina.

- In 2002, WS entered into an agreement with a large airport to depopulate a local white-tailed deer herd that posed a human safety threat. According to the FAA National Wildlife Strike Database, there were three reported deer strikes prior to 2002 (1994, 1996, and 1998) at this particular airport. Fortunately there were no major damages reported or lost lives. However, the deer strike in 1994 did cause several hundred thousands of dollars in damages and caused the aircraft (EMB-120) to abort take-off (FAA National Wildlife Strike Database 2005). In order to reduce air traffic hazards and alleviate the potential hazard to the flying public posed by white-tailed deer on the runway surface, WS implemented an IWDM approach including the lethal removal of deer. The deer damage management program has been successful with no reported deer strikes, according to the FAA National Wildlife Strike Database, since 2002. All work conducted by WS personnel was performed under the authority of a NCWRC Special Airport Depredation Permit issued to the airport.

- Since 2000, a military installation in North Carolina has entered into subsequent cooperative agreements with WS to conduct operational wildlife hazard reduction activities that have resulted in the lethal removal of white-tailed deer. During the 1990's, this military air station documented hazards associated with white-tailed deer use of their runway system. The majority of deer–aircraft incidents occurred during late summer through autumn. A more concerted focus on BASH (Bird/Wildlife Aircraft Strike Hazard) began in the late 1990's following a series of mishaps in which aircraft were lost off the facility and a series of deer strikes occurring on the air station (Begier 2002). As a result of the efforts of the WS BASH team, there have been no reported deer strikes at this air station since 2000. In addition, there is a *zero tolerance* policy for white-tailed deer on the airfield at this air station. All work conducted by WS personnel was performed under the authority of a NCWRC Special Airport Depredation Permit issued to the military base.

- Since 2001, a military installation in North Carolina entered into subsequent cooperative agreements with WS to conduct operational wildlife hazard reduction activities that have resulted in the lethal removal of white-tailed deer. White-tailed deer have been observed on the airfield year round, with a peak in observations in April and a reduction in March, September, and October. The deer on this military installation had adapted to the sounds and movements associated with the airfield and were often observed near the runway during flying operations. As a result of their proximity to the runway, this constituted a serious

threat to aviation safety at the military base (Good 2003). As a result of the concerted efforts made by the WS BASH team, no deer strikes have been reported at this installation since 2001. In addition, there is a *zero tolerance* policy for white-tailed deer on the airfield at this installation. All work conducted by WS personnel was performed under the authority of a NCWRC Special Airport Depredation Permit issued to the military base.

- Technical assistance has been provided by WS to resource/property owners on methods and techniques to effectively reduce damage and conflicts associated with white-tailed deer. WS technical assistance has included providing information on the biology and ecology of white-tailed deer, and effective, practical, and reasonable non-lethal and lethal methods. As presented in Table 1-1, WS received a total of seventy requests for technical assistance from 1999-2004. The highest number of requests received pertained to property damage (ornamentals), human health and safety issues (disease), and agriculture losses (loss of corn, soybeans, and fruit trees).

3.5 Alternatives Considered But Not Analyzed in Detail With Rational

3.5.1 Live Trapping and Relocation

Under this alternative WS would capture deer alive using cage-type live traps or capture drugs administrated by dart gun and then relocate the captured deer to another area. Numerous studies have shown that live-capture and relocation of deer is relatively expensive, time-consuming and inefficient (Ishmael and Rongstad 1984, O'Bryan and McCullough 1985, Diehl 1988, Jones and Witham 1990, Ishmael et al. 1995). Population reduction achieved through capture and relocation is labor intensive and would be costly ($273-$2,876/deer) (O'Bryan and McCullough 1985, Bryant and Ishmael 1991). Additionally, relocation frequently results in high mortality rates for deer (Cromwell et. al. 1999, O'Bryan and McCullough 1985, Jones and Witham 1990, Ishmael et. al. 1995). Deer frequently experience physiological trauma during capture and transportation, (capture myopathy) and deer mortality after relocation, from a wide range of causes within the first year, has ranged from 25-89% (Jones and Witham 1990, Mayer et al. 1993). O'Bryan and McCullough (1985) found that only 15% of radio-collared black-tailed deer that were live-captured and relocated from Angel Island, California, survived for one year after relocation. Although relocated deer usually do not return to their location of capture, some do settle in familiar suburban habitats and create nuisance problems for those communities (Bryant and Ishmael 1991). High mortality rates of relocated deer, combined with the manner in which many of these animals die, make it difficult to justify relocation as a humane alternative to lethal removal methods (Bryant and Ishmael 1991). Chemical Capture methods require specialized training and skill. A primary limitation of darting, the limited range at which deer can be effectively hit, is generally less than 40 yards. With modern scoped rifles, however, a skilled sharpshooter can hit the head or neck of a deer for a quick kill out to 200 yards and beyond (although a shot over 200 yards is not very likely). Thus, chemical capture is far less efficient, more labor intensive, and much more costly than lethal removal with rifles.

Translocation of wildlife is discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, potential for disease transfer and difficulties in adapting

to new locations or habitats. Also many states no longer permit the interstate transfer of deer due to recent concerns of chronic wasting disease outbreaks (section 1.3.6, page 9). If CWD is already present in North Carolina, relocating deer within the state could serve to vector the disease.

3.5.2 Population stabilization through birth control

Reproductive control is often considered for use where wildlife populations are overabundant and where traditional hunting or lethal control programs are not publicly acceptable (Muller et. al. 1997). Use and effectiveness of reproductive control as a wildlife population management tool is limited by population dynamic characteristics (longevity, age at onset of reproduction, population size and biological/cultural carrying capacity, etc.), habitat and environmental factors (isolation of target population, cover types, and access to target individuals, etc.), socioeconomic and other factors. Population modeling indicates that reproductive control is more efficient than lethal control only for some rodent and small bird species with high reproductive rates and low survival rates (Dolbeer 1998). Additionally, the need to treat a sufficiently large number of target animals, multiple treatments, and population dynamics of free-ranging populations place considerable logistic and economic constraints on the adoption of reproduction control technologies as a wildlife management tool for some species.

Reproductive control for wildlife could be accomplished either through sterilization (permanent) or contraception (reversible, initial treatment usually followed by a booster and annual follow-up treatments). Sterilization could be accomplished through: 1. Surgical sterilization (vasectomy, castration, and tubal ligation), 2. Chemosterilization, and 3. Gene therapy. Contraception could be accomplished through: 1. Hormone implantation (synthetic steroids such as progestins), 2. Immunocontraception (contraceptive vaccines), and 3. Oral contraception (progestin administered daily). Research into the use of these techniques would consist of laboratory/pen experimentation to determine and develop the sterilization or contraceptive material or procedure, field trials to develop the delivery system, and field experimentation to determine the effectiveness of the technique in achieving population reduction.

The use of hormones was investigated (Matschke 1976, 1977 a, b, c, 1980, and Roughton 1979), and eventually rejected as an effective and efficient reproductive control technique for deer. Additionally, concerns related to costs and logistics of widespread distribution of drugged baits, dosage control and ingestion of baits by children and non-target animals make oral contraception (by steroids) largely impractical (Lowery et al. 1993). More recently, immunocontraception has been studied in various situations and locations, but its potential use appears limited due to considerable constraints regarding treatment and follow-up treatment of a sufficiently large number of target animals, varying immunogenecity of vaccines, genetic backgrounds of individual animals, age, nutritional status, stress and other factors (Becker et al. 1997, Becker et al. 1999). The use of porcine zona pellucida (PZP) as a contraceptive agent in wildlife management has been investigated recently (Kirkpatrick et al. 1990, Turner and Kirpatrick 1991, Turner et al. 1992, and Turner et al. 1996), but to date, there is no published documentation that immunocontraceptive vaccines have successfully reduced any free-ranging white-tailed deer herd or population.

USDA National Wildlife Research Center (NWRC) scientists have developed GonaCon™, a new single dose immunocontraceptive vaccine that shows great promise as a wildlife infertility agent. Recent studies have demonstrated the efficacy of this single-shot GnRH vaccine on California ground squirrels, Norway rats, feral cats and dogs, feral swine, wild horses and white-tailed deer. Infertility among treated female swine and white-tailed deer lasted up to 2 years without requiring a booster vaccination (Miller et al. 2000). This vaccine overcomes one of the major obstacles of previous two dose vaccines, the need to only capture animals once to vaccinate them. A single-injection vaccine is much more practical as a field delivery system for use on free-ranging animals.

Ongoing studies initiated by NWRC in 2004, are examining the practicality of administrating GonaCon™ to free-ranging white-tailed deer as well as the efficacy, toxicity and safety of the vaccine. No fertility control agents have been approved by FDA for non-investigational use on wildlife populations in the U.S. Several materials, however, including GnRH and PZP vaccines, have been classified as investigational drugs that may be used only in rigidly controlled research studies. NWRC studies that are underway at several locations are being conducted as pivotal studies that are required as part of FDAs approval process for a new animal drug.

The single-shot, multiyear vaccine will be a useful technique for the management of enclosed or urban/suburban deer populations. However, GonaCon™ still has limitations, especially the need to capture and inject each animal. Scientists are hopeful that the GnRH vaccine will soon be approved for wildlife fertility control. If and when this vaccine is proven effective and safe to use for free-ranging white-tailed deer in North Carolina, this EA and its analysis would be supplemented pursuant to NEPA at that time.

Turner et al. (1993) noted that although contraception in white-tailed deer may be used to limit population growth, it will not reduce the number of deer in excess of the desired level in many circumstances. They further contend that initial population reductions by various other means may be necessary to achieve management goals, and that reproduction control would be one facet of an integrated program. In sum, although immunocontraceptive technology has been variously effective in laboratories, pens, and in island field applications, it has not been effective in reducing populations of free-ranging white-tailed deer.

The use of this method would be subject to approval by Federal and State Agencies. This alternative was not considered in detail because:

- it would take a number of years of implementation before the deer population would decline and therefore, damage would continue at the present unacceptable levels for a number of years;

- surgical sterilization would have to be conducted by licensed veterinarians, and would therefore be extremely expensive;

- it is difficult, time-consuming, and expensive to effectively live trap, chemically capture, or remotely treat the number of deer necessary to effect an eventual decline in the population; and

- State and Federal regulatory authorities have approved no chemical or biological agent for use as a deer contraceptive.

3.6 Standard Operating Procedures for Wildlife Damage Management Techniques

The current WS program, nationwide and in North Carolina, uses standard operating procedures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1997). Some key Standard Operating Procedures are listed in the following table.

Standard Operating Procedures	WS ALTERNATIVES				
	No Involvement	Tech. Asst.	Lethal	Nonlethal	IWDM: No Action (Preferred)
Animal Welfare and Humaneness of Methods Used by WS					
Research on selectivity and humaneness of management practices would be monitored and adopted as appropriate.			X	X	X
The Decision Model (Slate et al. 1992) is used to identify effective biological and ecologically sound deer damage management strategies and their impacts.			X	X	X
As appropriate, euthanasia procedures approved by the AVMA that cause minimal pain are used for live animals.			X		X
The use of newly developed, proven nonlethal methods would be encouraged when appropriate.				X	X
Drugs are used according to the Drug Enforcement Agency, FDA, and WS program policies and directives and procedures are followed that minimizes pain.			X	X	X
Safety Concerns Regarding WS Damage Management Methods					
The Decision Model (Slate et al. 1992), designed to identify the most appropriate damage management strategies and their impacts, is used to determine deer damage management strategies.			X	X	X
All controlled substances are registered with DEA or FDA.			X	X	X
WS employees would follow approved procedures outlined in the WS Field Manual for the Operational Use of Immobilizing and Euthanizing Drugs (Johnson et al. 2001).			X	X	X
WS employees that use controlled substances are trained to use each material and are certified to use controlled substances under Agency certification program.			X	X	X
WS employees who use controlled substances participate in State approved continuing education to keep abreast of developments and maintain their certifications.			X	X	X
Controlled substance use, storage, and disposal conform to label instruction and other applicable laws and regulations, and Executive Order 12898.			X	X	X
Material Safety Data Sheets for controlled substances are provided to all WS personnel involved with specific WDM activities.			X	X	X

Concerns about Impacts of Damage Management on Target Species, T&E Species, Species of Special Concern, and Non-target Species					
WS consulted with the USFWS and the NCWRC regarding the nation-wide program and would continue to implement all applicable measures identified by the USFWS and the NCWRC to ensure protection of T&E species.			X	X	X
Management actions would be directed toward localized populations or groups and/or individual offending animals.			X	X	X
WS personnel are trained and experienced to select the most appropriate methods for taking targeted animals and excluding non-target species.			X	X	X
WS would initiate informal consultation with the USFWS following any incidental take of T&E species.			X	X	X
WS take is monitored by number of animals by species with overall populations or trends in population to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (See Chapter 4).			X		X

CHAPTER 4: CONSEQUENCES OF THE DEER DAMAGE MANAGEMENT PROGRAM

This chapter provides information for making informed decisions on the deer damage management program outlined in Chapter 1, the issues and affected environments discussed in Chapter 2, and on cumulative impacts.

The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as "*. . . a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage.

Impacts from this management plan may be unforeseen, cumulative, or unavoidable. Such effects are discussed in relationship to each of the wildlife species and the resulting environmental impacts are analyzed in this chapter. This EA recognizes that the total annual removal of individual animals from wildlife populations by all causes is the cumulative mortality. Analysis of the North Carolina WS "*takes*" during past management activities and anticipated future activities, in combination with other mortality, indicates that cumulative impacts are not adversely affecting the viability and health of white-tailed deer populations. It is not anticipated that the WS program would result in any adverse cumulative impacts to T&E species, and deer damage management activities do not jeopardize public health and safety.

4.1 Analysis of Social Consequences and Resource Use

This section analyzes the environmental consequences using Alternative 5 as the No Action alternative and therefore will be used as the baseline when comparing the other alternatives to determine if the real or potential impacts are greater, lesser or the same (Table 4-2). The No Action alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and is a viable and reasonable alternative that could be selected and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the Council on Environmental Quality (CEQ) (1981).

4.1.1 Social and Recreational Concerns

These concerns are discussed throughout the document as they relate to issues raised during public involvement, and they are discussed in USDA (1997).

4.1.2 Irreversible and Irretrievable Commitments of Resources

The following resource values within North Carolina would not be adversely impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Other than minor uses of fuels for motor vehicles and electrical energy for office maintenance, there are no irreversible or irretrievable commitments of resources. Based on these estimates, the North Carolina WS program produces very negligible impacts on the supply of fossil fuels and electrical energy.

4.2 Alternatives Analyzed in Detail by Potential Impacts

Six key potential impacts of this program have been identified, and each of these impacts is discussed for each alternative. The six impacts include: effects on white-tailed deer populations; effects on plants and other wildlife species, including T&E species; effects on human health and safety; humaneness of methods to be used; effects on aesthetic values, and effects on regulated white-tailed deer hunting.

As described in section 2.1.4, in those situations where a non-federal cooperator has obtained the appropriate NCWRC permit or authority, and has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, however, certain aspects of the human environment may actually benefit more from WS's involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to selectively remove a target species than a non-WS entity; WS management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Alternative 1: No Deer Damage Management by WS

Effects on white-tailed deer populations: WS would conduct no deer damage management activities under this alternative. Management actions taken by non-federal entities would be considered the *environmental status quo*.

Local deer populations could decline, stay the same, or increase depending on actions taken by others. Some resource/property owners may kill deer, or allow other hunters access to hunt deer, during the hunting season. Resource/property owners may also obtain special permits from the NCWRC to allow them to shoot deer outside of the hunting season. Deer populations could continue to increase where hunting pressure was low or when an insufficient number of deer are removed under special permits issued by the NCWRC. Some local populations of deer would temporarily decline or stabilize where hunting pressure and permitted removal activities were adequate. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of deer out of frustration or ignorance (USDA 1997, White et al. 1989, USFWS 2001, USFDA 2003). While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the Preferred Alternative.

Effects on plants and other wildlife species, including T & E species: There would be no impact on non-target or T&E species by WS from this alternative. Management actions taken by non-federal entities would be considered the *environmental status quo*.

In the absence of a WS deer damage management program some resource/property owners with little or no shooting experience may attempt to remove deer. These resource/property owners could be more likely than WS personnel to take a non-target species and not report non-target take.

Damage caused by deer to wildlife species, including T&E species, may continue or increase in those situations where the resource/property owner does not implement their own deer damage management program or in those situations where a resource/property owner does not have the resources or abilities to implement an effective deer damage management program.

Effects on human health and safety: WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the *environmental status quo*.

Potential threats to human health and safety may continue or increase in those situations where the resource/property owner does not implement their own deer damage management program; or in those situations where a resource/property owner does not have the resources or abilities to implement an effective deer damage management program.

Inexperienced resource/property owners may attempt to solve deer damage problems through trapping and shooting. Therefore, there could be increased risks to human health and safety from improper or inexperienced use of damage management methods.

Humaneness of methods to be used: WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the *environmental status quo*.

Many people would consider this alternative humane because WS would not be involved in management actions. However, resource/property owners could use lethal and non-lethal methods to reduce deer damage. Some resource/property owners may take illegal action against localized populations of deer out of frustration of continued damage. These illegal actions may be less humane than methods used by experienced WS personnel. The humaneness of actions implemented by non-WS would be variable dependent upon the person implementing the action.

Effects on aesthetic values: WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the *environmental status quo*.

The impacts of this alternative to stakeholders would be variable depending on their values towards wildlife and compassion for their neighbors. Resource/property owners receiving damage from deer would likely strongly oppose this alternative because they would bear the damage caused by deer. Some individuals would prefer this alternative because they believe it is morally wrong to kill or use animals for any reason. Some people would support this alternative because they enjoy seeing deer, or having deer nearby. However, while WS would take no action under this alternative, other individuals or entities could, and likely would, conduct deer damage management activities resulting in impacts similar to the Preferred Alternative.

Effects on regulated white-tailed deer hunting: WS would have no impact on regulated deer hunting. However, resource/property owners may remove deer under special permits issued by

the NCWRC resulting in impacts similar to the Preferred Alternative. Management actions taken by non-federal entities would be considered the *environmental status quo.*

Alternative 2: Technical Assistance Only

Effects on white-tailed deer populations: No direct deer damage management activities would be conducted by WS under this alternative. Local deer populations could decline, stay the same, or increase depending on actions taken by others. Some resource/property owners may kill deer, or allow other hunters access to hunt deer, during the hunting season. Resource/property owners may obtain special permits from the NCWRC to allow them to shoot deer outside of the hunting season. Deer populations could continue to increase where hunting pressure was low or when an insufficient number of deer are removed under special permits issued by the NCWRC. Some local populations of deer would temporarily decline or stabilize where hunting pressure and permitted removal activities were adequate. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of deer out of frustration or ignorance (USDA 1997, White et al. 1989, USFWS 2001, USFDA 2003), but would likely occur at a lower rate than Alternative 1 if WS advice is obtained and implemented. While WS would provide technical assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the preferred alternative.

Effects on plants and other wildlife species, including T&E species: In the absence of an integrated deer damage management program that includes an operational WS program, some resource/property owners with little or no shooting experience may attempt to remove deer. These resource owners would be more likely than WS personnel to take a non-target species and not report non-target take, but would likely occur at a lower rate than Alternative 1 if WS advice is obtained and implemented.

Damage caused by deer to wildlife species, including T&E species, may continue or increase in those situations where the resource owner/property owner does not implement their own deer damage management program, does not have the resources or abilities to implement an effective deer damage management program, or does not seek and implement WS technical advice.

Effects on human health and safety: Potential threats to human health and safety may continue or increase in those situations where the resource/property owner does not implement their own deer damage management program; or in those situations where a resource/property owner does not have the resources or abilities to implement an effective deer damage management program. This increased threat would likely be less than Alternative 1 when WS recommendations are obtained and implemented.

Inexperienced resource/property owners may attempt to solve deer damage problems through trapping and shooting. Therefore, there could be increased risks to human health and safety from improper or inexperienced use of damage management methods. This increased risk would likely be less than Alternative 1 when WS recommendations are obtained and implemented.

Humaneness of methods to be used: Many people would consider this alternative humane because WS would not directly implement any deer control measures. Resource/property owners could use lethal and non-lethal methods recommended by WS to reduce deer damage or

implement their own control methods without WS assistance. Some resource/property owners may take illegal action against localized populations of deer out of frustration of continued damage. Some of these illegal actions may be less humane than methods used by experienced WS personnel. The humaneness of actions implemented by non-WS would be variable dependent upon the person implementing the action.

Effects on aesthetic values: The impacts of this alternative to stakeholders would be variable depending on their values towards wildlife and compassion for their neighbors. Resource/property owners receiving damage from deer would likely strongly oppose this alternative because they would bear the damage caused by deer. Some individuals would prefer this alternative because they believe it is morally wrong to kill or use animals for any reason. Some people would support this alternative because they enjoy seeing deer, or having deer nearby. However, while WS would take no direct action under this alternative, other individuals or entities could, and likely would, conduct deer damage management activities resulting in impacts similar to the Preferred Alternative.

Effects on regulated white-tailed deer hunting: WS would have no direct impact on regulated deer hunting. However, resource/property owners may remove deer under special permits issued by the NCWRC resulting in impacts similar to the preferred alternative.

Alternative 3: Lethal Deer Damage Management Only by WS

Effects on white-tailed deer populations: This alternative could result in a decrease in the local deer population at the specific site where the damage management occurs. Statewide, it is not anticipated that WS would kill more than 1,500 deer annually, on standard projects and in the event of a disease outbreak (Foot and Mouth or CWD) WS could kill up to 10,000 deer (at the request of the NCWRC). Therefore, the impacts on deer populations are expected to be similar to those described in the Preferred Alternative. New deer would likely re-inhabit the site as long as suitable habitat exists. The amount of time until new deer move into the area would vary depending on the habitat type, time of year, and population densities in the area.

Effects on plants and other wildlife species, including T&E species: WS take of non-target species is expected to be minimal or nonexistent. WS impacts would be similar to those described in the preferred alternative, except in situations where lethal methods could not be used or are ineffective at reducing damage to acceptable levels. In these situations the impacts from this alternative would be similar to alternative 1.

Effects on human health and safety: The potential risks to human safety from use of lethal methods by WS would be similar to the Preferred Alternative. WS follows all firearm safety precautions when conducting damage management and complies with all laws and regulations governing the lawful use of firearms.

The reduction of deer induced human health and safety threats would be similar to those described under the Preferred Alternative, except in those situations where lethal methods could not be used or are ineffective at reducing damage to acceptable levels. In those situations impacts would be similar to alternative 1.

Humaneness of methods to be used: WS personnel are experienced and professional in their use of management methods. Methods are applied as humanely as possible. Under this alternative, deer would be killed as humanely as possible by experienced WS personnel using the most appropriate method available. Some individuals could perceive these methods as inhumane because they oppose all lethal methods of damage management. Overall impacts would be similar to the Preferred Alternative.

Effects on aesthetic values: The impacts of this alternative to stakeholders would be variable depending on their values towards wildlife and compassion for their neighbors. This alternative would likely be favored by resource owners who are receiving damage when lethal actions effectively reduces damage to acceptable levels, although, some resource owners would be saddened if the deer were removed. Some individuals would strongly oppose this alternative because they believe it is morally wrong to kill or use animals for any reason or they believe the benefits from deer would outweigh the associated damage. The ability to view and aesthetically enjoy deer at a particular site could be limited if the deer are removed. The opportunity to view deer is available if a person makes the effort to visit sites with adequate habitat outside of the damage management area.

Effects on regulated white-tailed deer hunting: Lethal removal of deer by WS personnel would only occur after a permit has been issued by the NCWRC to remove deer that are causing damage or in those situations where deer are a potential human health and safety threat or are a threat of spreading diseases. This activity would result in reduced deer densities on local project areas and may reduce densities in some project area deer management zones, hence slightly reducing the number of deer that may otherwise be available to hunters during hunting seasons. The impact of this, however, is expected to be minimal due to:

A. the number of deer expected to be killed by WS is minimal when compared to the number taken by hunters in the zone(s) (4.8 % of the total NCWRC estimated hunter harvest) and
B. the number of deer expected to be killed by WS would not cause a statewide reduction in deer populations (1.0% of the estimated statewide population).

There may be some cases, where landowners have not permitted regulated deer hunting, but would allow WS employees to shoot deer. This would have only a minimal impact on deer hunting, since the land was not previously accessible to hunters. Overall impacts would be similar to the Preferred Alternative.

Alternative 4: Non-lethal Deer Damage Management Only by WS
Effects on white-tailed deer populations: WS would kill no deer under this alternative. Local deer populations could decline, stay the same, or increase depending on actions taken by others. Some resource/property owners may kill deer, or allow other hunters access to kill deer, during the legal hunting season. Resource/property owners may obtain special permits from the NCWRC to shoot deer outside of the hunting season. Deer populations could continue to increase where hunting pressure was low or when an insufficient number of deer are removed under special permits issued by the NCWRC. Some local populations of deer would temporarily decline or stabilize where hunting and permitted removal activities were adequate. Some

resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of deer out of frustration or ignorance (USDA 1997, White et al. 1989, USFWS 2001, USFDA 2003). While WS could only provide non-lethal assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the Preferred Alternative.

Effects on plants and other wildlife species, including T&E species: In the absence of an integrated deer damage management program by WS that includes the option of lethal removal of deer from damage sites, some resource/property owners with little or no shooting experience may attempt to remove deer. These inexperienced resource/property owners would be more likely than WS personnel to take a non-target species and not report non-target take. WS take of non-target species is expected to be minimal or nonexistent. The effects of WS use of non-lethal methods would be similar to those described under the Preferred Alternative.

WS impacts would be similar to those described in the preferred alternative, where nonlethal methods are effective at reducing damage to acceptable levels. When nonlethal methods are ineffective at reduce damage to acceptable levels and resource/property owners do not implement their own lethal control methods, damage caused by deer to wildlife species, including T&E species, may increase in those situations. In these situations impacts would be similar to alternative 1.

Effects on human health and safety: Concerns regarding WS use of lethal methods would be alleviated under this alternative. However, non-WS personnel would likely conduct lethal control actions that would not be available by WS resulting in impacts similar to alternative 1. The potential risks to human safety from use of non-lethal methods by WS would be similar to the Preferred Alternative.

Non-lethal methods would not be efficient or successful in resolving many deer damage situations. There are potential for increased threats to public health and safety when nonlethal methods are ineffective and non-WS personnel do not effectively reduce local deer herds. Resource/property owners may attempt to lethally resolve deer damage problems through illegal use of chemicals/pesticides, trapping, and shooting. In these situations there may be some risk to human health and safety from improper or inexperienced use of these methods. The reduction of deer induced human health and safety threats would be similar to those described under the Preferred Alternative in those situations where nonlethal methods are effective at reducing damage to acceptable levels. In those situations where nonlethal methods are ineffective impacts would be similar to alternative 1.

Humaneness of methods to be used: WS personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Some individuals may perceive this approach as humane because they oppose all lethal methods of damage management. However, without effective damage management methods available, resource/property owners may take illegal action against some local populations of deer out of frustration of continued damage. Some of these illegal actions may be less humane than methods used by WS personnel. While WS could only provide non-lethal assistance under this alternative,

other individuals or entities could conduct lethal damage management with impacts similar to alternative 1.

Effects on aesthetic values: The impacts of this alternative to stakeholders would be variable depending on the damage management efforts employed by resource/property owners, their values toward deer and compassion for their neighbors. Resource/property owners who are receiving damage from deer would likely oppose this management alternative when nonlethal methods are ineffective. Some people would support this alternative because they believe resource owners would do little to remove deer. Others would oppose this alternative because they believe resource/property owners would use illegal, inhumane, or environmentally unsafe methods. While WS could only provide non-lethal assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the Preferred Alternative.

Effects on regulated white-tailed deer hunting: WS would have no impact on regulated deer hunting since WS would not lethally remove deer under this alternative. However, resource/property owners may remove deer under special permits issued by the NCWRC resulting in impacts similar to the Preferred Alternative.

Alternative 5: Integrated Deer Damage Management Program: No Action (Preferred Alternative)

Effects on white-tailed deer populations: During FY 2002, FY2003 and FY 2004 WS lethally removed 6, 37, and 19 white-tailed deer, respectively, while conducting deer damage management activities in North Carolina. Based upon an anticipated increase in requests for assistance, the North Carolina WS program expects that no more than 1,500 deer would be lethally removed annually, under permits issued by the NCWRC, while conducting WS direct control activities within the state. However, in the event of a disease outbreak (Foot and Mouth or CWD) WS could kill up to 10,000 deer (at the request of the NCWRC). Therefore, 10,000 deer was used to analyze WS potential impacts to the statewide deer population in North Carolina.

The authority for management of resident wildlife species is the responsibility of the NCWRC, and deer are classified as protected big game. The NCWRC collects and compiles information on white-tailed deer population trends and take, and uses this information to manage deer populations. This information has been provided to WS to assist in the analysis of potential impacts of WS activities on the deer herd in North Carolina.

Currently, the NCWRC estimates the statewide white-tailed deer population at about 1 to 1.1 million deer (NCWRC 2004). The North Carolina deer population is estimated from population modeling, which includes harvest trend analysis, and monitoring of vital statistics of the deer herd (NCWRC 2004).

Using the 2003-2004 estimated hunter harvest (207,250), the number of deer killed under NCWRC issued Deer Depredation Permits (569 in year 2003), and the potential lethal take of 10,000 deer annually by WS (in case of a disease outbreak), the possibility of WS lethal deer damage management activities adversely affecting the overall North Carolina deer population is

considered low. The cumulative lethal take from WS and non-WS entities (20-22 % of the statewide population) appears to be far beneath the level that would begin to cause a decline in the overall statewide North Carolina deer population, but some local population reductions may occur (E. Stanford, NCWRC, pers. Comm. 2005).

In those situations where a non-federal cooperator has obtained the appropriate NCWRC permit or authority, and has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*.

Effects on plants and other wildlife species, including T&E species: Direct impacts on non-target species occur if WS program personnel were to inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species.

WS personnel are trained and experienced to select the most appropriate tools and methods for taking target animals and excluding non-targets. WS take of non-target species is expected to be minimal or nonexistent. Other wildlife populations would not be negatively affected, except for the occasional scaring effect from the sound of gunshots and non-lethal harassment methods. In these cases, birds and other mammals may temporarily leave the immediate vicinity, but would most likely return after conclusion of the action. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. WS personnel set traps in locations that are conducive to capturing target animals while minimizing potential impacts to non-target species. Any non-target species captured unharmed in a live trap would be subsequently released on site. To date, no non-target animals have been killed by WS conducting deer damage management activities in North Carolina.

Any operational uses of capture, sedating or euthanasia drugs would be used in accordance with applicable laws and regulations regulating their use. Adherence to these laws and regulations should avoid unreasonable adverse effects on the environment. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

WS has requested and obtained the USFWS and NCWRC list of Endangered, Threatened and Special Concern species in North Carolina. WS will periodically consult with the USFWS and NCWRC to ensure that actions taken under this plan will not adversely affect NC listed species.

> *Federally Listed Species*. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of wildlife damage management methods on T&E species and has obtained a Biological Opinion (USDI 1992). For the full context of the Biological Opinion, see Appendix F of the ADC Final EIS (USDA 1997, Appendix F).

Based on the conclusions made by USFWS during their 1992 programmatic consultation of WS activities and subsequent Biological Opinion, it was determined that management activities being utilized for deer damage management in North Carolina would not adversely affect T&E species listed in North Carolina, except for those species listed in Table 4-1. The animal and plant species listed in Table 4-1 were not included in the 1992 programmatic consultation. Furthermore, the North Carolina WS program has determined the proposed program would have no effect on those T&E species considered extirpated from the state; those T&E species and associated critical habitat listed in Table 4-1; and on those methods not included in the 1992 Biological Opinion.

Table 4-1. Federal listed Threatened and Endangered species in North Carolina not included in the 1992 Biological Opinion.

Common Name	Scientific Name	Status
Bog turtle	*Clemmys muhlenbergii*	T(S/A)
Manatee	*Trichechus manatus*	E
Dwarf wedgemussel	*Alasmidonta heterodon*	E
Appalachian elktoe	*Alasmidonta raveneliana*	E
Oyster mussel	*Epioblasma capsaeformis*	E
Carolina heelsplitter	*Lasmigona decorate*	E
Spruce-fir moss spider	*Microhexura montivaga*	E
Saint Francis' satyr	*Neonympha mitchellii francisci*	E
Noonday globe (=snail)	*Patera clatki nantahala*	T
Littlewing pearlymussel	*Pegias fabula*	E
James spinymussel	*Pleurobema collina*	E
Cumberland bean	*Waltoncythere acuta*	E
Sensitive jointvetch	*Aeschynomene virginica*	T
Seabeach amaranth	*Amaranthus pumilus*	T
Small-anthered bittercress	*Cardamine micranthera*	E
Golden sedge	*Carex lutea*	E
Smooth coneflower	*Echinacea laevigata*	E
Spreading avens	*Geum radiatum*	E
Schweinitz's sunflower	*Helianthus schweinitzii*	E
Swamp pink	*Helonias bullata*	T
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T
Roan Mountain bluet	*Houstonia montana*	E
Mountain golden heather	*Hodsonia montana*	T
Heller's blazing star	*Liatris helleri*	T
Harperella	*Ptilimnium nodosum*	E
Michaux's sumac	*Rhus michauxii*	E
American chaffseed	*Schwalbea americana*	E
White irisette	*Sisyrinchium dichotomum*	E
Virginia spiraea	*Spiraea virginiana*	T
Cooley's meadowrue	*Thalictrum cooleyi*	E
Rock gnome lichen	*Gymnoderma lineare*	E

E - Endangered, T – Threatened, S/A – Federally protected due to similarity of appearance

State Listed Species. WS has determined that the proposed deer damage management program will not adversely affect any North Carolina State listed threatened or endangered species or species of special concern.

WS could benefit listed species by reducing deer browsing damage to listed plant species and to habitats of listed animal species. This alternative would likely reduce the damaging effects that deer are having on native flora and fauna, including the recovery of threatened and endangered species to acceptable levels since all damage management methods could be considered for potential use. An IWDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing deer damage.

In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, dependent upon the skills and abilities of the non-federal entity, WS management activities may have less of an impact non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Effects on human health and safety: WS's deer damage management methods, including shooting and trapping, pose minimal or no threat to human health and safety. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS' use of these methods is expected.

WS follows firearm safety precautions when conducting damage management and WS complies with all laws and regulations governing the lawful use of firearms. Shooting with rifles is used to reduce deer damage when lethal methods are determined to be appropriate. WS could use firearms to euthanize deer captured in live traps. WS' traps are strategically placed to minimize exposure to the public. Appropriate signs are posted on all properties where traps are set to alert the public of their presence.

The use of firearms can be a politically sensitive issue because of the occasional carelessness and misuse of firearms by people. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety-and-use training program within three months of their appointment and a refresher course every two years afterwards (WS Directive 2.615). WS employees, who use firearms as a condition of employment, are required to certify that they meet the criteria as stated in the *Lautenberg Amendment*.

This alternative would have the greatest potential to reduce threats to public health and safety from a site by alleviating potential threats of transmitting diseases, and potential deer/aircraft and deer/vehicle collisions since all available lethal and nonlethal methods could be considered for

use or recommended. An IWDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing deer damage.

In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, dependent upon the skills and abilities of the non-federal entity, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Humaneness of methods to be used: WS personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Damage management methods viewed by some persons as inhumane would be employed by WS under this alternative. These methods would include shooting, trapping, and immobilization and euthanasia drugs. Under this alternative, deer would be shot or captured as humanely as possible by experienced WS personnel using the best method available. Deer live-captured would be subsequently euthanized. Some individuals may perceive these methods as inhumane because they oppose all lethal methods of damage management. However, this alternative allows WS to consider non-lethal methods, and WS would implement non-lethal methods for deer damage management when appropriate.

In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, dependent upon the skills and abilities of the non-federal entity, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Effects on aesthetic values: The impacts of this alternative to stakeholders would be variable depending on their values towards wildlife and compassion for their neighbors. Most resource owners who are incurring damage would likely favor this alternative as it allows for an IWDM approach to resolving damage problems. The proposed IWDM approach allows for the use of the most appropriate damage management methods. Most stakeholders without damage would also prefer this alternative to Alternative 3, where all deer are killed, because non-lethal methods could be appropriate to resolve damage problems in some situations. Some individuals would strongly oppose this alternative, and most action alternatives, because they believe it is morally wrong to kill or use animals for any reason or they believe that the benefits from deer outweigh the associated damage.

The ability to view and aesthetically enjoy deer at a particular site could be limited if the deer are removed. New deer, however, would likely use the site in the future, although the length of time until new animals arrive is variable, depending on the habitat, time of year, and population densities in the area. The opportunity to view deer is available if a person makes the effort to visit sites with adequate habitat outside of the damage management area.

Public reaction would be variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to reduce conflicts/problems between humans and wildlife. An IWDM approach, which includes non-lethal and lethal methods, provides relief from damage or threats to human health or safety to those people who would have no relief from such damage or threats if non-lethal methods were ineffective or impractical. Many people directly affected by problems and threats to human health or safety caused by deer insist upon their removal from the property or public location when the wildlife acceptance capacity is reached or exceeded. Some people will have the opinion that deer should be captured and relocated to a rural area to alleviate damage or threats to human health or safety. Some people would strongly oppose removal of the deer regardless of the amount of damage. Individuals not directly affected by the threats or damage may be supportive, neutral, or totally opposed to any removal of deer from specific locations or sites. Some people that totally oppose lethal damage management want WS to teach tolerance for deer damage and threats to public health or safety, and that deer should never be killed.

In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, dependent upon the skills and abilities of the non-federal entity, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Effects on regulated white-tailed deer hunting: Lethal removal of deer by WS personnel would only occur after a permit has been issued by the NCWRC to remove deer that are causing damage or in those situations where deer are a potential human health and safety threat or are a threat of spreading diseases. This activity would result in reduced deer densities on local project areas and may reduce densities in some project area deer management zones, hence reducing the number of deer that may otherwise be available to hunters during hunting seasons. The impact of this activity, however, is expected to be minimal due to:

A. the number of deer expected to be killed by WS is minimal when compared to the number taken by hunters in the zone(s) (4.8% of the total NCWRC estimated hunter harvest) and
B. the number of deer expected to be killed by WS would not cause a statewide reduction in deer populations (1.0% of the estimated statewide population).

There may be some cases, where landowners have not permitted regulated deer hunting, but would allow WS employees to shoot deer. This would have a minimal impact on deer hunting, since the land was not previously accessible to hunters.

In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance, WS participation in carrying out the action will not affect the *environmental status quo*.

4.3 Cumulative Impacts

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and

reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Cumulative Impacts on Wildlife Populations
Deer damage management methods used or recommended by the WS program will likely have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of white-tailed deer is anticipated to have minimal impacts on overall populations in North Carolina. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent.

Cumulative Impact Potential from Chemical Components
Repellants and immobilization and euthanasia drugs may be used or recommended by WS. Characteristics and use patterns of these methods indicate that no significant cumulative impacts are expected from their use in WS deer damage management programs.

Cumulative Impact Potential from Non-chemical Components
Non-chemical methods used or recommended by WS may include exclusion, habitat modification, trapping, harassment methods and shooting. No cumulative impacts from WS use of these methods are expected.

SUMMARY
No significant cumulative environmental impacts are expected from any of the 5 alternatives.

Under the Preferred Alternative and Alternative 3, the lethal removal of deer would not have a significant impact on overall deer populations in North Carolina, but some local reductions may occur. This is supported by the NCWRC, which is the agency with responsibility for managing wildlife in the State. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 2, 3, 4, and 5 since only trained and experienced wildlife biologists would conduct and recommend deer damage management activities. There is a slight increased risk to public safety when a person rejects WS assistance and recommendations in Alternatives 2, 3, 4, and 5.

Under Alternative 1, management actions taken by non-federal entities would be considered the *environmental status quo*. In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage white-tailed deer to stop damage with or without WS assistance in Alternatives 2, 3, 4 and 5, WS participation in carrying out the action will not affect the *environmental status quo*. In some situations, dependent upon the skills and abilities of the non-federal entity, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

Although some persons will likely be opposed to WS' participation in deer damage management activities, the analysis in this EA indicates that WS IWDM program will not result in significant, cumulative, adverse impacts on the quality of the human environment.

Table 4-2 Comparisons of Issues/Impacts and Alternatives

Issues/Impacts	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
Effects on white-tailed deer populations	WS would not affect population. If resource owner conducts lethal deer management, effect would be similar to Alternative 5.	WS would not affect population. If resource owner conducts lethal deer management, effect would be similar to Alternative 5.	Local population would be reduced and sustained at a lower level. No effect on statewide deer population.	WS would not affect population. If resource owner conducts lethal deer management, effect would be similar to Alternative 5.	Local population would be reduced and sustained at a lower level. No effect on statewide deer population.
Effects on plants and other wildlife species, including T&E species	No impact by WS. Positive impact to those species that are being negatively impacted by deer if resource owner implements effective damage reduction program.	No impact by WS. Positive impact to those species that are being negatively impacted by deer if resource owner implements effective damage reduction program.	No adverse impacts by WS. Positive impact to those species that are being negatively impacted by deer if lethal methods are effective.	No adverse impacts by WS. Positive impact to those species that are being negatively impacted by deer if nonlethal methods are effective.	No adverse impacts by WS. Positive impact to those species that are being negatively impacted by deer.
Effects on human health and safety	No impact by WS. If resource owners conduct deer damage management, effect would be variable.	No impact by WS. If resource owners conduct deer damage management, effect would be variable.	No adverse impact by WS. Positive effect from reduced deer strikes and disease transmission if lethal methods are effective.	No adverse impact by WS. Positive effect from reduced deer strikes and disease transmission if nonlethal methods are effective.	No adverse impact by WS. Positive effect from reduced deer strikes and disease transmission.
Humaneness of methods to be used	Most would view as humane. If resource owners conduct deer management activities, effects would be variable.	Most would view as humane. If resource owners conduct deer management activities, effects would be variable.	Effects would be variable. Some would view as inhumane.	Most would view as humane. If resource owners conduct lethal deer management activities, effects would be variable.	Effects would be variable. Some would view as inhumane.

Issues/Impacts	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
Effects on aesthetic values	Population would remain the same or increase. Increased opportunity to view deer. If resource owner conducts deer damage management activities, effects would be similar to Alternative 5.	Population would remain the same or increase. Increased opportunity to view deer. If resource owner conducts deer damage management activities, effects would be similar to Alternative 5.	Local population would be reduced, less opportunity to view deer at damage site. Reduction in damage if WS lethal actions effective.	WS would not affect population. Population would remain the same or increase. Increased opportunity to view deer. Reduction in damage if WS nonlethal actions effective. If resource owners conduct lethal deer damage management activities, effect would be similar to Alternative 5.	Local population would be reduced, less opportunity to view deer at damage site. Damage would be reduced.
Effects on regulated white-tailed deer hunting	No effect by WS. Slight reduction in the number of deer that may otherwise be available to hunters during hunting seasons if resource owner implements lethal control methods.	No effect by WS. Slight reduction in the number of deer that may otherwise be available to hunters during hunting seasons if resource owner implements lethal control methods.	Slight reduction in the number of deer that may otherwise be available to hunters during hunting seasons	No effect by WS. Slight reduction in the number of deer that may otherwise be available to hunters during hunting seasons if resource owner implements lethal control methods.	Slight reduction in the number of deer that may otherwise be available to hunters during hunting seasons

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APPENDIX A

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APPENDIX B

WHITE-TAILED DEER DAMAGE MANAGEMENT METHODS RECOMMENDED or AUTHORIZED for USE by THE NORTH CAROLINA WILDLIFE SERVICES PROGRAM

NONLETHAL METHODS

Resource Management

These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Resource owner/manager implements cultural methods and other management techniques. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality. These methods include:

Changes in human behavior: These may include altering the flight times of departing and arriving aircraft so that flying is at a time period of low wildlife activity. It may also include restricting departures and arrivals on specific runways.

Habitat modification: Habitat modification can be an integral part of wildlife damage management (WDM). Wildlife production and/or presence are directly related to the type, quality and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain wildlife species. The resource/property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of WDM strategies at or near airports to reduce problems by eliminating loafing, bedding and feeding sites. Generally, many problems on airport properties can be minimized through management of vegetation and water on areas adjacent to aircraft runways.

Livestock management: Modifying or eliminating habitat utilized by deer may change deer behavior and reduce some deer-human conflicts. This could include reducing vegetative cover and forage plants used or preferred by deer. One method, to eliminate habitat, is using cattle to consume the biomass that deer and other wildlife would feed upon. Reardon and Merrill report that continuous heavy grazing by cattle or by mixed classes of livestock eliminated preferred deer foods and adversely impacts other aspects of white-tailed deer habitat. (Reardon and Merrill 1976, Merrill et al. 1957, Merrill 1959) Crawford noted that livestock grazing affects the vigor and composition of plants and the direction and rapidity of plant succession. Thus, it can significantly influence carrying capacity of white-tailed deer habit (Crawford 1984).

Cultural practices: Studies in agriculture areas of Missouri indicate cultivated crops comprised 41% of deer diet by volume (Beringer J. and Hansen L. P. 1997). Thus, by reducing the amount of crops adjacent to the airports runways, deer densities next to these areas may decrease. For example, brome grass could be chosen to replace row crops, as brome is not a highly preferred

plant species by deer, relative to other row crops, alfalfa and clover and still provides the owner with a source of revenue.

Physical Exclusion

A fence can limit the entry of deer onto affected properties. There are several types of fences that inhibit the movement of deer if properly installed, including electric fencing, woven wire, and chain link fencing. The height of a fence required to exclude deer is a much debated topic. Smith and Coggin (1984) reported that a 7-foot fence (2.1-meters) reduced deer-vehicle collisions by 44.3 to 83.9 percent along a New York Thruway. Clearly and Dolbeer (1999) recommend that airports install a 10-foot chain link fence with barbed-wire outriggers to limit deer entry. For the purpose of this EA, WS recommends a fence height of 12 feet, with an additional three feet buried below the ground, to exclude deer.

Behavior Modification

This refers to tactics that alter the behavior of wildlife to reduce damage. Effective behavior modification usually requires integrating two or more auditory scaring or visual scaring techniques.

Auditory scaring techniques

The proper use of frightening devices and harassment techniques including sirens, flashing lights, electronic distress sounds, pyrotechnics, propane exploders, dogs, and rubber projectiles fired from a shotgun could help reduce conflicts (Craven and Hygnstrom 1994). Used in the proper context, these devices can help keep deer away from conflict areas. Some disadvantages are that these methods can be labor intensive and expensive. Also, frightening methods must be continued indefinitely unless the deer population is reduced or excluded from the resource.

Pyrotechnics: Pyrotechnics are specialized fireworks that are shot out of a 12-gauge shotgun or starter's pistol to deter deer or other wildlife. To be successful, pyrotechnics should be carried by wildlife control personnel at all times and used whenever the situation warrants. Continued use of pyrotechnics, alone may lessen the effectiveness.

Propane Cannons: Propane cannons are mechanical devices that use propane gas and an igniter to produce a loud explosive sound. Propane cannons are often suggested as effective frightening agents for deer (Craven and Hygnstrom 1994), and have been used frequently in attempts to reduce crop damage and encroachment on airports. Research has shown that propane cannons detonated systematically at 8-10 minute intervals are effective in frightening deer away from protected areas for two days. Motion-activated cannons however, detonate only when deer approach the area to be protected and have been shown to be effective up to 6 weeks. (Belant et al. 1996).

Visual scaring techniques

Visual techniques such as use of mylar tape (highly reflective surface produces flashes of light), eye-spot balloons (the large eyes supposedly give deer a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing deer damage in a localized area for a limited time period.

Repellents
Repellents have had mixed results in reducing deer damage to shrubs and trees (Palmer et al. 1983, Matschke et al. 1984, Conover 1984, Hygnstrom and Craven 1988, Andelt et al. 1991, Craven and Hygnstrom 1994). Results are generally linked to deer numbers, availability of preferred food plant species, alternate food sources, season, and weather. Commercial repellents are costly ranging from $20/gallon to $80/gallon.

Repellents require continuous applications and are limited in their effectiveness. The effectiveness of a topical repellent is directly related to residue present on the plant. Rain, heavy dew and watering will remove the residue requiring reapplication of the material. The use of repellents can cause a decrease in native vegetation by shifting browsing pressure from protected plants to native flora. The effectiveness of repellents decreases as deer numbers increase and available food plants decrease.

LETHAL METHODS

Sharpshooting
Studies have suggested that localized management by removing deer is an effective tool where deer are causing undesirable effects (McNutly et al.1997). This research supports the hypothesis that the removal of a small, localized group of white-tailed deer would create a population of low density in that localized area.

WS would conduct sharpshooting, with centerfire rifles, during daylight or at night using spotlights or night-vision equipment. Rifles would be equipped with sound suppressors, to avoid disturbance, and to facilitate success by minimizing the tendency of deer to flee from the sound of gunfire. Shots would be taken from elevated positions in tree stands, in the beds of trucks, or other vantage points. Elevated positions cause a downward angle of trajectory, so that any bullets that inadvertently miss or pass through targeted deer, will hit into the ground or into earthen embankments to minimize the risk of stray bullets presenting a safety hazard to people, pets, or property. WS personnel would strive for head and neck shots when shooting deer to achieve quick, humane kills. Bait may be used to attract deer to safe sites for shooting and to enhance success and efficiency. The venison from deer killed by WS would be, when possible, processed and donated for consumption, at one or more charitable organizations. WS will be responsible for properly preparing deer and the delivery to a USDA approved meat processor.

Only WS personnel, who have completed firearms safety training, have demonstrated skill and proficiency with the firearms used for deer removal, and have been approved for sharpshooting by the State Director in North Carolina will participate in sharpshooting deer.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety-and-use training program within three months of their appointment and a refresher course every two years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which

prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Live Capture and Euthanasia

Some situations restrict or do not warrant standard shooting operations. In such cases it may be appropriate to remove individual deer by trapping and euthanizing the animals. Clover traps, box traps, drop nets, and rocket nets are several methods that can be used to live capture deer. Deer that are live captured would subsequently be dispatched using a handgun or a rifle.

It is also possible to live capture deer using chemical immobilization drugs. Deer that are immobilized would be subsequently euthanized. The following are immobilizing/euthanasia drugs that could be used to capture/euthanize deer:

Ketamine (Ketamine HCl) is a dissociative anesthetic that is used to capture wildlife, primarily mammals, birds, and reptiles. It is used to eliminate pain, calms fear, and allay anxiety. Ketamine is possibly the most versatile drug for chemical capture, and it has a wide safety margin (Fowler and Miller 1999). When used alone, this drug may produce muscle tension, resulting in shaking, staring, increased body heat, and, on occasion, seizures. Usually, ketamine is combined with other drugs such as xylazine. The combination of such drugs is used to control an animal, maximize the reduction of stress and pain, and increase human and animal safety.

Telazol (tiletamine) is another anesthetic used in wildlife capture. It is 2.5 to 5 times more potent than ketamine; therefore, it generally works faster and lasts longer. Currently, tiletamine can only be purchased as Telazol, which is a mixture of two drugs: tiletamine and zolazepam (a tranquilizer). Muscle tension varies with species. Telazol produces extensive muscle tension in dogs, but produces a more relaxed anesthesia in coyotes, wolves, and bears. It is often the drug of choice for these wild species (Fowler and Miller 1999). This drug is sold in a powder form and must be reconstituted with sterile water before use. Once mixed with sterile water, the shelf life is four days at room temperature and 14 days if refrigerated.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia. It can also be used alone to facilitate physical restraint. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. When using ketamine/xylazine combinations, xylazine will usually overcome the tension produced by ketamine, resulting in a relaxed, anesthetized animal (Fowler and Miller 1999). This reduces heat production from muscle tension, but can lead to lower body temperatures when working in cold conditions.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. There are DEA restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife.

Certified WS personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

Hunting Programs

WS sometimes recommends sport hunting as a viable damage management method when the deer can be legally hunted. A valid hunting license and other licenses or permits may be required by the NCWRC. This method provides sport and food for hunters and requires no cost to the landowner.

APPENDIX C

Federal Listed Threatened and Endangered Species in North Carolina

Common Name	Scientific Name	Status
Vertebrates:		
Shortnose sturgeon	*Acipenser brevirostrum*	E
American Alligator	*Alligator mississippiensis*	T(S/A)
Red wolf	*Canis rufus*	E
Loggerhead sea turtle	*Caretta caretta*	T
Piping plover (Atlantic)	*Charadrius melodus*	T
Green sea turtle	*Chelonia mydas*	T
Bog turtle	*Clemmys muhlenbergii*	T(S/A)
Virginia big-eared bat	*Townsendii virginianus*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Hawksbill sea turtle	*Eretmochelys imbricate*	E
Spotfin chub	*Erimonax monachus*	T
Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E
Bald eagle*	*Haliaeetus leucocephalus*	T (proposed for delisting)
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Waccamaw silverside	*Menidia extensa*	T
Wood stork	*Mycteria Americana*	E
Gray bat	*Myotis grisescens*	E
Indiana bat	*Myotis sodalis*	E
Cape Fear shiner	*Notropis mekistocholas*	E
Red-cockaded woodpecker	*Picoides borealis*	E
Eastern cougar	*Puma concolor couguar*	E
Roseate tern	*Sterna dougallii*	E
Manatee	*Trichechus manatus*	E
Invertebrates:		
Dwarf wedgemussel	*Alasmidonta heterodon*	E
Appalachian elktoe	*Alasmidonta raveneliana*	E
Tar river spinymussel	*Elliptio steinstansana*	E
Oyster mussel	*Epioblasma capsaeformis*	E
Carolina heelsplitter	*Lasmigona decorate*	E
Spruce-fir moss spider	*Microhexura montivaga*	E
Saint Francis' satyr	*Neonympha mitchellii francisci*	E
Noonday globe (=snail)	*Patera clatki nantahala*	T
Littlewing pearlymussel	*Pegias fabula*	E
James spinymussel	*Pleurobema collina*	E
Cumberland bean	*Waltoncythere acuta*	E

Vascular Plants:

Sensitive jointvetch	*Aeschynomene virginica*	T
Seabeach amaranth	*Amaranthus pumilus*	T
Small-anthered bittercress	*Cardamine micranthera*	E
Golden sedge	*Carex lutea*	E
Smooth coneflower	*Echinacea laevigata*	E
Spreading avens	*Geum radiatum*	E
Schweinitz's sunflower	*Helianthus schweinitzii*	E
Swamp pink	*Helonias bullata*	T
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T
Roan Mountain bluet	*Houstonia montana*	E
Mountain golden heather	*Hodsonia montana*	T
Small whorled pogonia	*Isotria medeoloides*	T
Heller's blazing star	*Liatris helleri*	T
Southern spicebush	*Lindera melissifolia*	E
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E
Canby's dropwort	*Oxypolis canbyi*	E
Harperella	*Ptilimnium nodosum*	E
Michaux's sumac	*Rhus michauxii*	E
Bunched arrowhead	*Sagittaria fasciculata*	E
Mountain sweet pitcher-plant	*Sarracenia rubra ssp. Jonesii*	E
Green pitcher-plant	*Sarracenia oreophila*	E
American chaffseed	*Schwalbea americana*	E
White irisette	*Sisyrinchium dichotomum*	E
Blue Ridge goldenrod	*Solidago spithamaea*	T
Virginia spiraea	*Spiraea virginiana*	T
Cooley's meadowrue	*Thalictrum cooleyi*	E

Nonvascular Plants:

Rock gnome lichen	*Gymnoderma lineare*	E

E - Endangered, T – Threatened, S/A – Federally protected due to similarity of appearance,
* proposed for delisting; U.S. Fish & Wildlife Service, Northeast Region, Region Four